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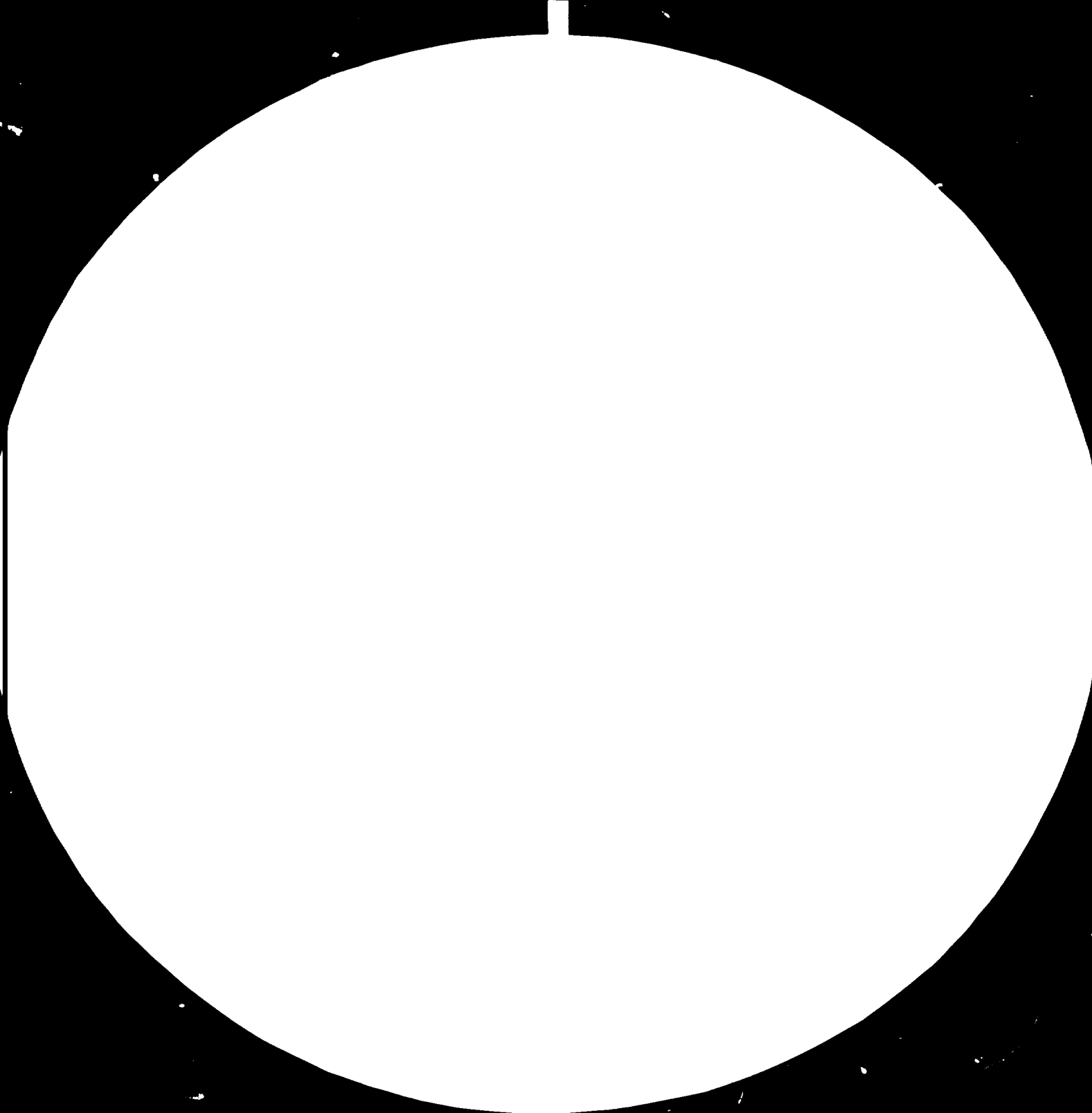

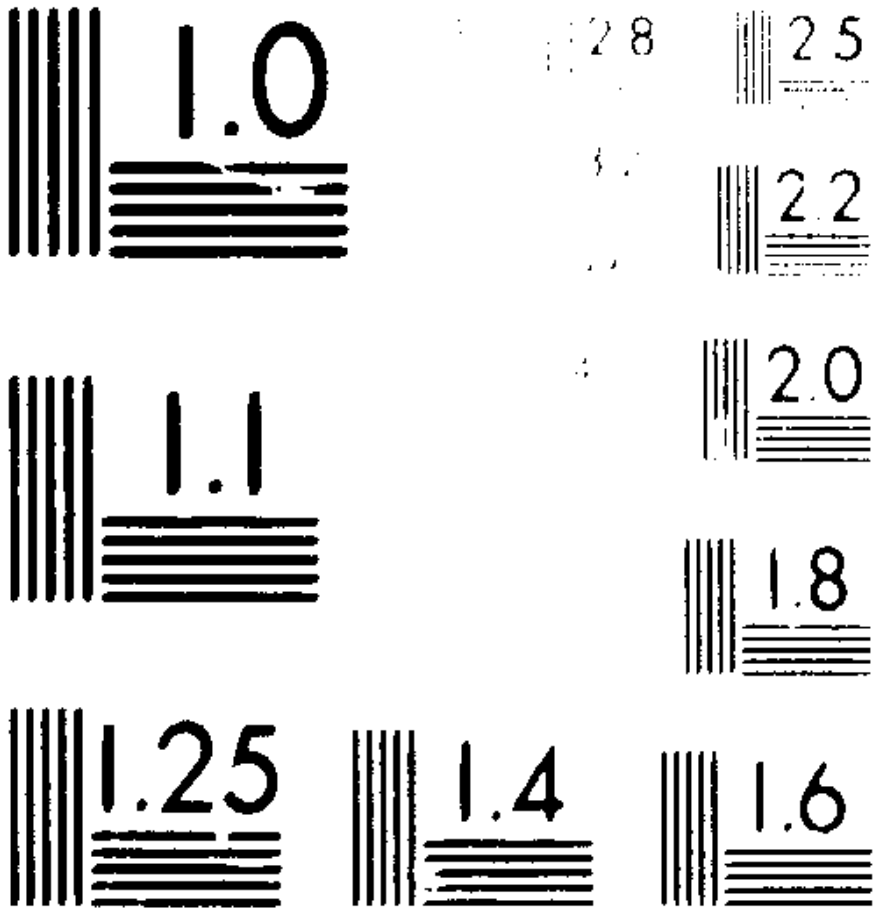
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ASSISTANCE IN MARINE ENGINEERING FIELD.

UNIDO PROJECT Nº UF/TRI/81/053

NEPTUN PROPOSAL EVALUATION.

FINAL REPORT

SENERMAR

MARCH, 81

A B S T R A C T

This report explains the analysis and recommendations prepared by the UNIDO's mission which has visited the Trinidad and Tobago Republic. Their conclusions are based on the Neptun proposal for the removal of wrecks and objects from the bottom of Port of Spain harbour, and the complementary information available at the moment of the mission's trip.

The necessity of coordinating the harbour expansion plan and the clearing up before the final decision have been enphasized, and therefore, this report includes recommendations as a basis for the Authorities' decision.

There are some local equipment available and their collaboration would be interesting as a very important contribution, not only for the reduction of foreign currency payment, but also the advantage of training a local team in this type of work since the same will be repetitive in the future.

The economical analysis of Neptun proposal cannot be performed out of its context and conditions. For this reason, the possibility of facing the problem from complementary point of view has been considered in this report as very important. Observations and comments on price and time estimates of Neptun proposal, specially those with a large incidence in the total amount, have been included.

In order to facilitate the decision of the Trinidad and Tobago Govern-

ment, recommendations in priorities, organization and time schedule of implementation have been included as an alternative solution.

The pertinent annexes to make operative the decision in a short time, once it has been approved by the Government, are also included.

TABLE OF CONTENTS

1. SCOPE OF WORK

The aim of the project development is to promote the full use of the harbour and equip it for handling a larger traffic of goods and passangers.

In this line, the present report will be developed in two main aspects, as follows:

- Evaluation of available proposal (*) for the removal of objects from Port of Spain harbour.

- Technical recommendations for facing the problems in accordance with the harbour plan expansion.

(*) At present, only Neptun proposal is available.

2. INTRODUCTION

The Port of Spain harbour in Trinidad is littered on the ocean bottom with an important number of wrecks and objects.

The Government would now like to know whether all of the identified objects should be cleared up in order to ensure the safe operation of the port and whether the cost estimates, already available, are realistic.

In this way, during the thi-d week of March, UNIDO's mission invited by the Trinidad and Tobago Authorities, has visited Port of Spain in order to collect information for the evaluation of the available proposal.

This report explains the data picked up by the mission and develops the general recommendations to be considered by the Trinidad and Tobago Authorities for the solution of the problem.

3. PRELIMINARIES

3.1. ORGANIZATION AND WORK SCHEDULE OF THE MISSION

The Trinidad and Tobago Government asked UNIDO for technical assistance in the evaluation of the proposal for the clearing up of bottom in Port of Spain harbour.

UNIDO accepted the invitation and sent a mission to visit the field and contact with the people knowing the problem.

The mission was constituted by Mr. Panyusnkin, as UNIDO's Representative and Mr. Madinabeitia, as an expert. They visited the area in order to make an approach of the proposal evaluation.

During the third week of March, the mission has contacted in Port of Spain with the principal local Authorities involved in the decision for the removal.

The list of people contacted is shown in Annex A.

3.2. DISCUSSIONS AND COLLECTION OF DATA

The general information related to removal was given by the Ministry of Transport and Communications including Neptun proposal, which is the only proposal available at present.

Complementary information was collected during several trips to the harbour area with the collaboration of Harbour Authorities and the kind assistance of the Coast Guard.

The partial data were discussed in several meetings being the preliminary resulting analysis presented, as a Preliminary Report, in a general meeting held in the Ministry of Transport and Communications with the Authorities involved in the removal of wrecks and objects from Port of Spain harbour, on 20th March, 1981.

The Preliminary Report was discussed in depth and finally was accepted, including some suggestions to clarify paragraphs 2 and 5 in chapter "Findings and Recommendation". This Report was de'ivered to Mr. Lenny F. Farfan, Permanent Secretary in the Ministry of Transport and Communications.

3.3. BACKGROUND INFORMATION

The Government of Trinidad and Tobago contracted with the Company Neptun Transport & Marine Service AB the bottom survey of the harbour of Port of Spain, especially those wrecks and objects which could be a danger for shipping and dredging.

Some work for clearing up the harbour has already been done in the past but the present situat'on states the advantage of a new removal of objects from the bottom for the full operation of the harbour in a safe level.

4. MAGNITUDE OF THE PROBLEM

4.1. PRESENT SITUATION

During the survey operation it has been confirmed that 60 objects are lying in the bottom harbour and additional 144 objects were located below the mudline. All these wrecks and objects are shown in the charts and lists included in the Survey Report made by Neptun in spring, 1980.

In accordance with the Sonar Recorder, the objects shown on the record appear like darker parts compared with the surrounding bottom, and very hard objects give a different picture from the softer parts in the sea-beds.

If the darkness is above mudline, it is possible to identify the objects using divers and in many cases it has been confirmed that darkness was shells, mudwalls or fish.

Below mudline is no point to use divers and therefore is impossible to confirm the list of darkness as objects.

Even though Neptun has experience in this type of jobs and this company has used skilled geo-physical surveyor, the interpretation of the records, in this case, is very difficult and some percentage of mistakes may have been slided.

4.2. AVAILABLE PROPOSALS

At present only Neptun proposal is available.

The Firm Neptun Transport & Marine Service AB has been working in Port of Spain harbour during the last years, firstly in the removal of 21 objects from the bottom and also in the Survey operation so as to establish the amount of objects located within the harbour area of Port of Spain.

From the above reasons it is easy to understand that there is only one proposal available, since any other firm with the same experience has the handicap of the mobilization of main crafts.

This is an important point when taking a decision for removal, but it should be bearing in mind that an equipment with high lifting capacity is only needed, in an absolute manner, for a few number of objects, and the best solution will be the balance between prices and times.

In other words, the removal of an object from the sea bottom has two steps:

- accuracy in the localization of each object
- the proper removal

The first operation has been carried out by Neptun in his survey and it must be completed, by the same company, giving the geographical co-ordinates for every object.

The transfer from UTM co-ordinates to the geographical ones will facilitate the object localization for another company and Trinidad and Tobago Coast Guard will be able to control the advance of work.

In the second aspect, the proper removal, there are two choices:

- to use an equipment with high lifting capacity, which is able to remove a wreck in only one manoeuvre. This equipment does not exist in the Trinidad & Tobago Republic. Its cost is very expensive but it needed for a short time.

- to use an equipment now available in Trinidad and Tobago. This equipment has a smaller lifting capacity and therefore, some wrecks need to be cut into pieces before their removal. The use of this equipment is less expensive but a longer time is required.

The Neptun proposal desired the first choice without thinking over the possibility of using local equipment for some works. This decision involves an exceptional consequence in the total amount of the work.

4.3. MASTER PLAN FOR PORT EXPANSION

The harbour of Port of Spain has presently two dredges areas:

- General cargo quays, including the entrance named Grier Channel.

- National Fisheries with the entrance named New Channel.

Although a port expansion master plan has not been shown to the mission during the trip, some general ideas have been explained about it.

The first problem of the harbour is to reacha normal safing standard for the areas related above and their approaches. In this way, a dredging in the new channel is foreseen in a short time as an approach to the National Fisheries, extending the depth up to 15' and the width up to 275'.

When dredging has been finished, the rational expansion of the harbour will be directed towards Northern direction, as an enlargment of the present commercial quays.

The general chart showing the existing quays, the proposed dredging and the new quays has been drawn and included in Annex B.

4.4. COORDINATION BETWEEN THE REMOVAL AND PORT EXPANSION PLAN

It is obvious that bottom clearing of Port of Spain harbour is a very long and expensive work. However it must be carried out to put the harbour facilities in a safe level.

Not all the objects lying in the bottom disturb the navigation in the same way since only some ones are situated in the channel or dredged areas. The great number of objects are located out of the normal navigation routes.

In a first analysis, to remove only the objects from the dredged areas would have some disadvantages, because this decision will oblige the navigation to follow the dredged channels and the increase of traffic will, in a medium term, require its enlargement .

To impose this traffic politics or the restriction to follow only

the dredged channels will allow to reduce the number of objects to be removed to a minimum in a first step.

The following phases should be co-ordinated with harbour expansion needs once the same are approved and the work started.

It may be very important to know all the implications in the coordination between both tasks, not only from the technical and economical points of view but also in the functional and operational aspects, in order to take them into account in the decision of every phase. To facilitate the Government's decision some information is included in Annexes F and G.

5. FINDINGS AND RECOMMENDATIONS

5.1. DESCRIPTION OF THE PERFORMED SURVEY

The survey of objects in the harbour bottom of Port of Spain carried out by Neptun, had two main objectives:

- The accurate location of objects lying in the bottom
- To know the nature of said objects.

The first operation has been carried out by means of a Trisponder Receiver/Transmitter and a Distance Measuring Unit related with two Remote Stations at shore selected points, which transfer the ranges to UTM co-ordinates and show the position of the vessel on a prepared chart. This first operation had two phases.

In phase I, location of objects above mud, a Klein Sidescan Sonar, Model 521, modified to be used at 100 m scale, has been used, giving a width of 200 m and an overlap of 50 m at each side.

In phase II, location of objects below mudline, since a greater resolution was necessary, a sound of 37.5 m has been used. Said sound can penetrate up to 25 m into the mud according to its consistency.

In this manner, the physical situation of objects was carried out with sufficient accuracy.

A second operation, the identification of nature of objects, was foreseen to be carried out in two steps: an interpretation of the records obtained which was performed in the office, and a checking by means

of divers in those cases in which the objects are above the mud.

As a consequence, this visual checking, carried out by Neptun's divers, gave as a result the positive identification of 34 objects, such as, wrecks, beacons or clusters (page 4 of Survey Report, Port of Spain Harbour, chapter I).

Said report does not show how many and which from the 63 shadows of the sound records were shells, consistent mud, etc, but it maintains the listing and identification included in chapter 2 of mentioned report.

However the Phase II, consisting in the location of objects below the mud could not be checked in any case by means of divers direct control, which originates a greater uncertainty in many cases. Neptun, that due to its experience in this type of works knows the problem, has used experts in this interpretation, but the possibility of error is relatively high.

As a summary, the survey has been outlined according to the good practice in this kind of works, some of the best and more suitable equipment to obtain the underwater records have been used. Neptun has taken into account a specic care in the interpretation of the records. Thus the work can be considered of good quality.

However, this kind of work obliges to maintain a high average level of doubt in some identifications and could happen that shadow records unrelated to things or objects were shells or mudwalls. The percentage of these cases is very difficult to define according to the purpose of this report.

Annex C shows the present situation of the wrecks in the harbour area.

5.2. AVAILABLE LOCAL EQUIPMENT

The fact that,in Port of Spain harbour,there are suitable equipment for the bottom clearing up with sufficient capability for the removal of any of the existing wrecks, raises the question of why their utilization has not been considered.

From Neptun's point of view, the answer is obvious since its outline is as follows:

For the removal of several objects a great lifting capacity is necessary. These sophisticated equipment are not available in Trinidad and Tobago and therefore, it is necessary to bring them from a foreign country.

Once the equipment is in Trinidad and Tobago area, it is suitable for use in all the works because the utilization time is shortened and there is a better distribution of overheads.

In the utilization of local equipment, a co-ordination of different working equipment is necessary and in many cases it will oblige to cut the wrecks in more pieces to remove them, with an increase in the scheduled time.

However, this argument, that could be certain for the Phase I or for close priority phase, is not valid for the rest of the job, assuming that the other works may be done according to the real necessities without a great problem of timing.

Taking into account the necessities of Trinidad and Tobago, there are other possible answers connected with their port expansion programme.

In a first step, it is necessary to remove the wrecks which may interfere with the navigation in the dredged areas. For this operation,only for approximately a 20% of the objects, a lifting capacity over 50 tons, excluding crab weight, is required.

The problem may be solved by means of the partial utilization of the existing equipment in Port of Spain, with the assistance of an experienced company in this kind of works. This company would have to transfer to the area a great lifting capacity equipment.

This operation has been carried out by Neptun, as said before.

A list of available local equipment is stated in Annex E.

5.3. OPERATIONAL DESIGNATION FOR THE REMOVAL

The removal requires an operational plan developed in detail, in which for every object, the most adequate equipment and the foreseen work sequence were defined.

The operation plan will have to follow the basic condition to get the best results using the local equipment complemented only to the necessary extent with more sophisticated equipment, all of which in co-ordination with the port expansion.

Before the operations begin, the contractors should submit a description, paying special attention to barge unloading that had received

the wrecks and to the suitable control proposed for checking, that no parts of the wrecks are left in the bottom of the port area.

A generic designation such as "once the crane is over the object, slings will be fitted or the crab will be lowered down to enable the hoisting" should not be accepted.

This designation is only theoric due to the fact that in many instances the wrecks will be broken into pieces when trying to pull them out and the task will be converted in the result of cluster removal. Thus a foreseen handling operation of an unique time will be transformed in a scattering of wrecks what will multiplied the number of handling operations and costs.

5.4. INFLUENCE OF TECHNICAL FACTORS ON RATES AND SCHEDULE OF THE WORK

The technical factors and above all the designation of elevation facilities and loading capacities of barges have a great influence in costs and work schedule .

The greater the lifting capacity is, the greater the number of objects to be removed in a sole handling operation will be.

In case an object, due to its weight or size could not be removed in a sole handling operation, the number of pieces to be broken will be limited to the minimum possible.

Against this positive affirmation, regarding the time factor, we want to make two comments:

First, the unit cost of the equipment will be too high and in relation with the total time, the lifting time is too short. The major percentage of time is spent in positioning, transportation for one point to another and delays between operations, being minimum the time spent in the handling operation.

Second, many objets are small in size and weight, being the utilization of a sophisticated equipment too much for the real needs.

It is also necessary to add that it cannot be selected the adequate equipment to each wreck, as using a great number of equipment would be too costly. On the contrary, an effort should be done to reduce to a minimum possible the using of sophisticated and costly equipment.

Another technical factor to bear in mind, due to its influence in rates and schedule work, is the number and type of wrecks to be moved in each phase, because using sophisticated equipment with few movements could raise its unitary price as a result of the cost influence of mobilizations and overheads.

The solution would be found in a balance between the utilization of sophisticated equipment with high lifting capacity and an adequate utilization of local available equipment, based on a careful co-ordination and a management carried out by an experienced firm in this kind of work.

It would also have to bear in mind that wreckages have occurred in Port of Spain harbour area in the past and it is also possible that may occur the same in the future.

The present situation in which the number and location of wrecks could endanger the navigation safety must not be repeated. Therefore, it could be convenient that the Harbour Authorities take advantage of the ocassion to prepare the equipment ready to start up and train some people to cooperate in the future in harbour maintenance.

5.5. AVERAGE RATES AND DURATION OF WORKS ON REMOVAL OF UNDERWATER OBJECTS

As defined in previous chapters, the relation between duration of works and type of equipment is direct. For this reason, the average rates could not be define in an abstrat way, but in relation with a work schedule and the type of equipment to be used.

Due to this circumstance, a table of average values could not be given as standard costs or international standard for the type of work foreseen in Port of Spain harbour.

However, the evaluation required by the Trinidad and Tobago Authorities would not be complete if Neptun's rates were not checked in the context in which they were prepared and their validity reviewed.

In this context, table rates of September 3, 1980, sent by Neptun Transports & Marine Services to the attention of Mr. Farfan (Permanent Secretary of Ministry of Transport and Communications) have been taken into account.

Consideration has been given to those prices the percentage of which amount the 5% or above and that it could affect substantially to the total cost.

All these concepts are shown in the below table indicating the reference number of Neptun proposal; the percentage of its estimate budget in relation with total and unitary rate when this is representative as well as an observation related to its cost levels.

Concept	%	Neptun Rate	Observations
1a. Floating crane Hebe 1	30.9	13.500 $/day	slightly high
1b. Barge Goliat 3	4.6	2,000 $/day	normal level
1c. Tugs 700 HP	6.2	1,350 $/day	normal level
3. Divers assistance	4.4	390 $/day	high
5. Local labour	4.9	2,150 $/day	*
18. Administration fee	5.2	-	normal level
19. Management fee	14.3	-	slightly high
20. Stand-by	4.4	-	**
Total	74.9	-	-

Remarks

The rates of equipment 1a, 1b, 1c include cost of crew.

* Local level cost can be analyzed with better knowledge by Trinidad and Tobago Authorities.

  Local labour 5. is unskilled labour.

** As indicated by Neptun in his offer, this figure is not a scientific one. Therefore, we are unable to make comment on this item.

The total price of the Neptun's proposal is the result of applying the unitary rates to the estimate time to perform every removal operation. Neptun has included in its proposal no indication to justify the calculation of said estimate time.

Under these circumstances it is no possible to analyse them in depth.

The necessary time to every handling operation, as indicated before, is considerably small comparing it with the standby, transports and preparation of handling operation which permit with a good programming and coordination to reduce substantially the total schedules.

With the available information, it could be estimated that the Neptun suggested periods in his proposal are ample with an important prevision for unforeseen works which vary generally between 50% for short term estimations (a day) and 20% for long term estimations.

The above fact is of such a great importance, that the problem must be faced. Therefore, it is necessary to put some firms in competence. Said firms should have same capability and experience in this kind of works.

5.6. RECOMMENDATIONS FOR THE APPROACH TO THE PROBLEM

The approach to this problem could be tackle from different angles from which only one has been chosen by Neptun in his proposal. However, in Neptune solution the needs of harbour expansion plan have not been properly considered.

The harbour has at present available some facilities and dredged areas, including two access channels which define their own limitations.

According to the type and dimensions of the vessels foreseen to use the harbour in the near future, the width of dredged channels and the safety extrawidth should be designed.

Due to the average number and type of vessels which visit the harbour, it seems unreasonable to compare the design values with those considered in the approach to the Suez Channel or Buenos Aires harbour. In this way, it is necessary to bear in mind the port real needs according with a better knowledge of the matter.

Vessels up to 20000 DWT have beams under 25 m. This figure compared with the dredged channel width, aprox. 200 m, gives a rate above 6-7 beams, value considered as necessary to maintain the good navigation conditions in an open channel during the crossing of two vessels sailing in opposite direction.

All these considerations lead to the conclusion that it is convenient to perform in phase I the removal in dredged channel area only, including the dredged slopes.

For depths of about 30' and natural bottoms of 12-15', these slopes are covered with the clearing up of objects in an extrawidth of 100 m. That is, half the channel width.

The same criteria could be applied to the access channel to National Fisheries.

The clearing up of other areas must be considered as a small problem to be included in the future expansion of the infrastructure or the facilities in the harbour area.

The cost of this clearing up will not disturb the schedule time and finantial sources on the whole project.

5.7. PRIORITIES AND RECOMMENDATIONS ON THE SCOPE OF WORK TO BE DONE

As a basis for the taking of decisions by the Government of Trinidad and Tobago, the priorities and recommendations based on the available information are listed below.

1. It is necessary to clear up some specific areas of port sea bottom, so that the present facilities can operate at a full and safety level.

2. The definition of the specific areas mentioned in point 1, must be co-ordinated with the harbour general expansion plan.

3. The clearing up of the defined areas is today necessary and urgent. These areas must be defined by the Government, but in order to facilitate his decision, this report should advise the study of phase I, as per annexes C and F.

4. The removal of the biggest objects should be made with sophisticated equipment and, therefore, this report recommends to contact experienced firms. In this way, annexes H and J include a list of said companies.

5. Furthermore, most of the objects can be removed using partially local equipment. The use of this equipment will oblige to form a work team in the Port of Spain Harbour.

6. It seems that the best solution would be the co-ordination of both foreign and local teams under a skilled Manager. For this reason, the report recommends the use of local equipment as much as possible by the foreign team.

7. Said coordination and the use of local equipment must be useful for training a local team in this kind of work.

8. It must be considered that the presence of sophisticated equipment in the area, in this case from Neptun, can imply a limitation to other offers with the same experience.

9. This report recommends that a sole Official Body, Harbour Authorities, Coast Guard, etc. perform the works in order to check the whole work.

10. Policies Rules for dredged channel navigation should be issued punishing the navigation through other areas.

5.8. ORGANIZATION AND TIME SCHEDULE OF IMPLEMENTATION

The main points to be analyzed for the organization and time schedule of the work implementation are the following:

- Definition of the scope of work to be done in each phase.

- Forwarding of documents for invitation for bids.

- Reception and analysis of proposal.

The definition of the scope of work of each phase must be decided by the Ministry and included in the invitation for bid to be sent to the companies.

A standard request document for project proposal is attached in annex H.

Following the work schedule to be done before the contract award, the Ministry will send the pre-selected companies or those ones able to carry out the work, a letter or telex indicating the main terms of the project and asking for their interest in the submission of a tender for this work.

The time for the reception of answers to this question would be about two weeks.

In annex J a list of well-known companies which have carried out similar maritime works, is included.

When the list of companies interested in tendering had been defined, the Ministry will send those companies the standard request (annex H) for elaboration of proposals. These documents will be attached to a letter where the name of person or section of the Ministry to be contacted for any subject about the offer must be indicated.

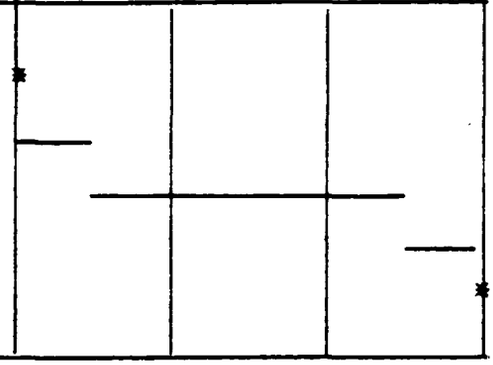
All suggestions or additional information required by any of the

tenderers would be made and answered by writing to all companies involved.

Once the proposals are received a team of the Ministry must analyse them in both technical and economical aspects. This analysis would be finished before two weeks and the company will be selected.

An important aspect in the selection can be the finantial terms of the offer which must be secured.

TIME SCHEDULE

Concepts	Months
- Government decision	
- Invitations for bids	
- Elaboration of proposals	
- Analysis of proposal	
- Award	

6. SHIPBUILDING AND SHIPREPAIR FACILITIES IN TRINIDAD AND TOBAGO

Observations on related matters connected with improvements and development of shipbuilding and shiprepair facilities in Trinidad and Tobago were suggested during the mission's trip.

It seems that there is a need for consultancy, supply and rehabilitation of equipment in order to improve the operation of the port in full capacity and to meet the needs of the country.

This assistance may be provided at the request of the Government in the framework of the UNDP country programme.

7. TABLE OF ANNEXES

ANNEXES

March, 81
PM-2164

ANNEX A: LIST OF PEOPLE CONTACTED

1. UNDP Office

Mr. L. Eriksson, Deputy Resident Representative
Mrs.P. Austin, Assistant Resident Representative
Mr. K.D. Schäfer, UNIDO/JPO

2. MINISTRY OF EXTERNAL AFFAIRS

Mr. C. Thomas, Head Division of Science, Technology and International Trade
Mrs. P. Alleyne, Deputy Head Division of Science, Technology and International Trade

3. MINISTRY OF TRANSPORT & COMMUNICATIONS

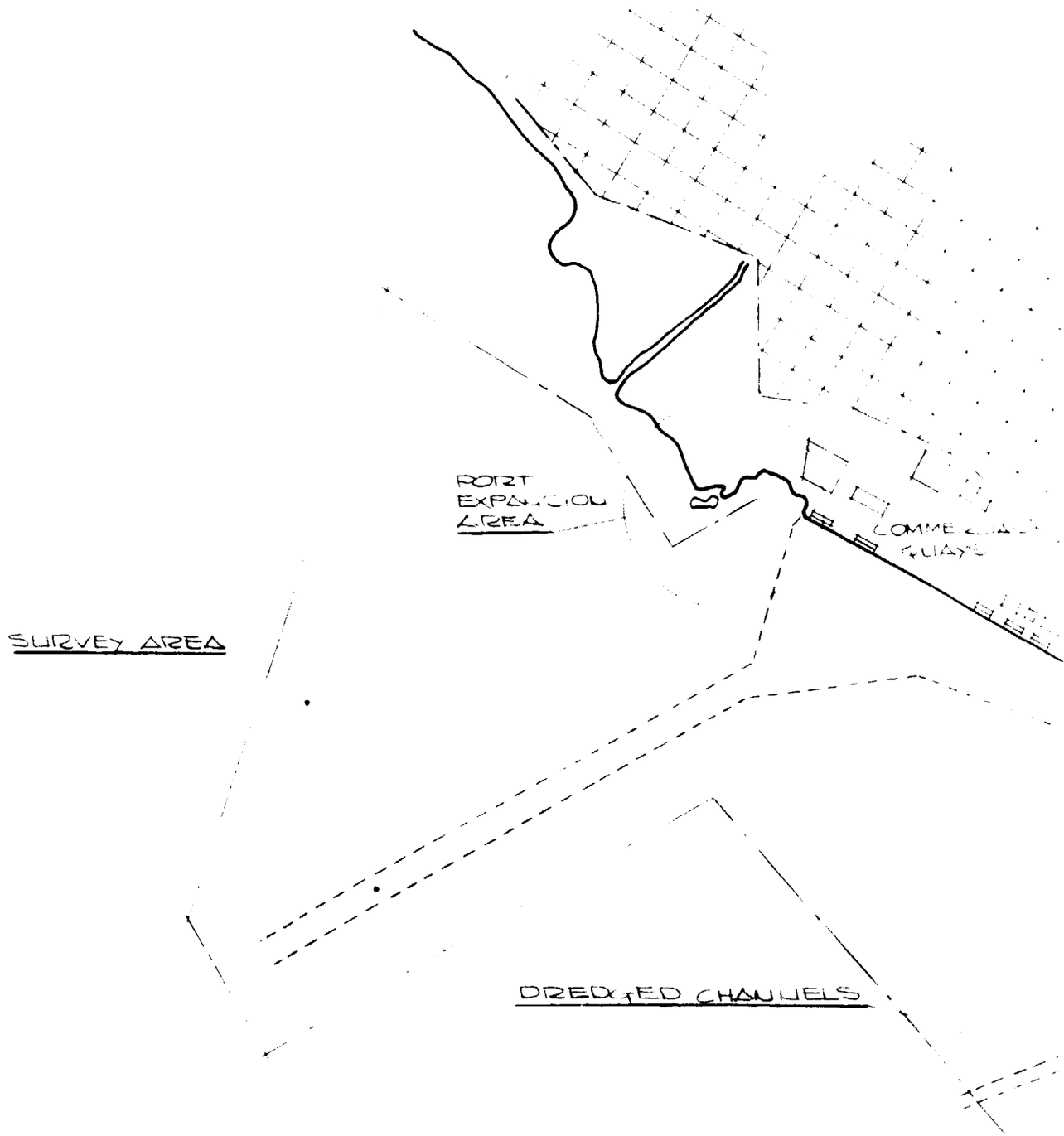
Mr. L.F. Farfan, Permanent Secretary
Mr. K. Ramcharita, Senior Economist
Mrs. I.M. Nicholson, Shipping Advisor to the Minister

4. TRINIDAD & TOBAGO COAST GUARD

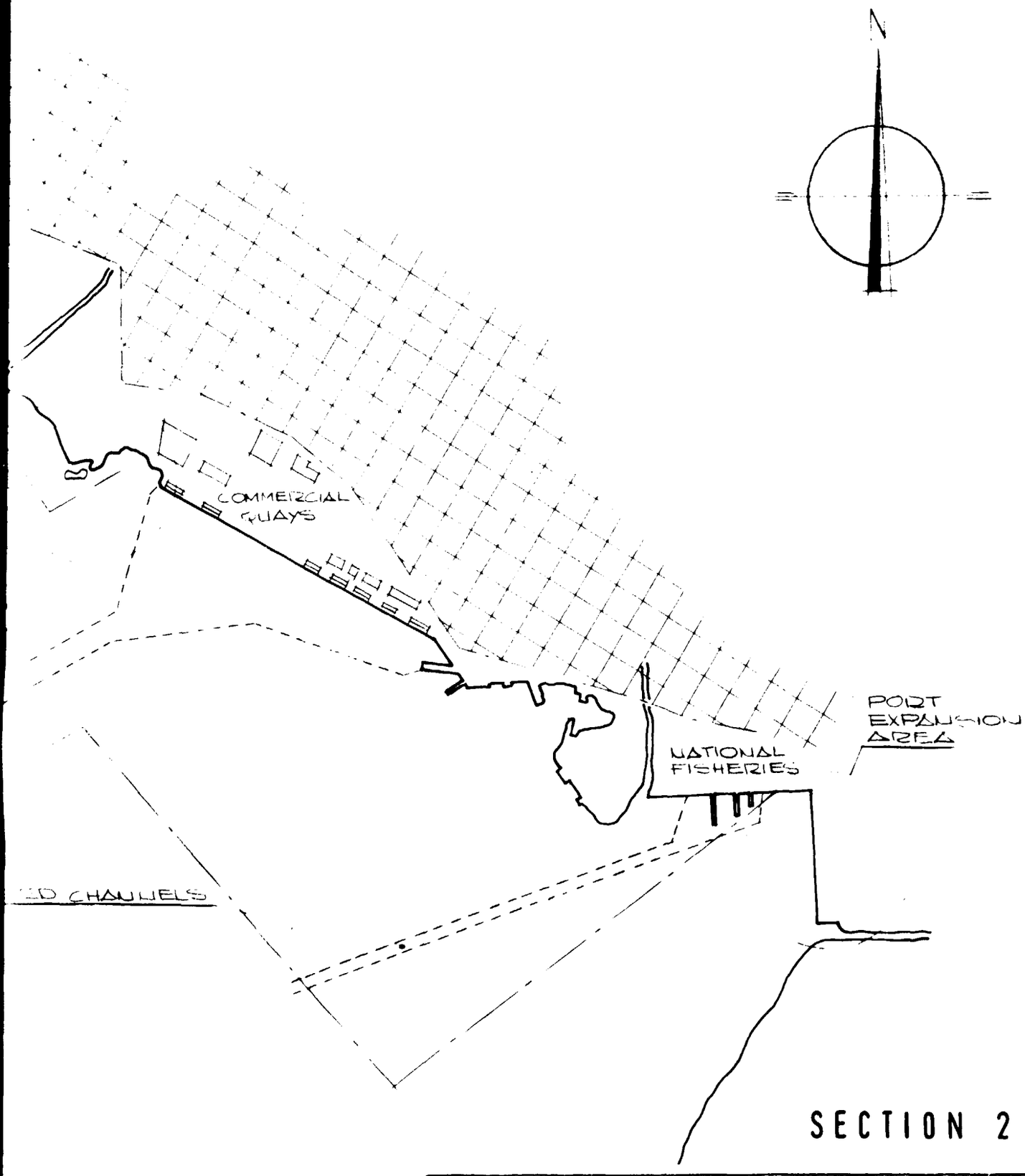
Lt. L.F. Farray

5. PORT AUTHORITY OF TRINIDAD & TOBAGO

Mr. B. Sankar, Assistant to General Manager
Mr. F.C. Gillette, Assistant to General Manager
Mr. E. Phipps, Assistant Port Engineer
Mr. C. Phillip, Harbormaster


PORT
EXPANSION
AREA
SURVEY AREA
DREDGED CHANNELS
0
500
1000
2000 M

SECTION 1



ANNEX B

LAY OUT OF PORT OF SPAIN HARBOUR

DATA: MARCH 30, 1981 | PM - 2164 - 01

SOME FIGURES
OF THIS DOCUMENT
ARE TOO LARGE
FOR MICROFICHING
AND WILL NOT
BE PHOTOGRAPHED.

ANNEX D: LIST OF EQUIPMENT IN NEPTUN'S PROPOSAL

Craft	Tecnical Data
1. Floating crane "Hebe 1"	
. Pontoon length	45.00 m
. Pontoon breadth	20.00 m
. Pontoon height	3.60 m
. Pontoon draught, abt.	1.60 m
. Load in main arm	400 t at 6 m
	120 t at 20 m
. Load in crane jib	95 t at 30 m
	50 t at 40 m

The above loads have been deduced, as an example, from the load-outreach diagram.

2. Submersible barge with reinforced deck "Goliat 3"	
. Length	90.00 m
. Breadth	24.00 m
. Depth	6.20 m
. Loaded draft	4.96 m
. Deck cargo area	2.000 m^2
. Deadweight	8.100 t
3. Tugs "Saleh" and "Hassan"	
. Length	15.70 m

. Breadth	4.80 m
. Depth	2.30 m
. Output twin screw	700 HP

4. Auxiliary equipment

. Positioning equipment	No information available
. Crawler bulldozer	No information available
. Front loader	No information available
. Diving equipment	No information available

ANNEX E: LIST OF AVAILABLE LOCAL EQUIPMENT

Craft	Technical Data
1. Floating Crane "Chaguaramas"	
. Pontoon length	43.30 m
. Pontoon breadth	17.70 m
. Pontoon height	3.00 m
. Pontoon draught	1.53 m
. Maximum lifting capacity	60 t

This crane cannot work with crab; it only works with slings.

2. Barges

No information available

3. Tugs

"Trinidad and Tobago"

. Length	33.25 m
. Breadth	8.50 m
. Depth	3.65 m
. Output	1.200 HP

"Bonito"

. Length	30.50 m
. Breadth	9.50 m
. Depth	3.65 m
. Output	2.600 HP

4. Auxiliary equipment

No information available

ANNEX F: LIST OF OBJECTS TO BE REMOVED. PRIORITY I

This annex includes the list of wrecks and objects located in the bottom of the Port of Spain harbour which disturb the safe navegation in the dredged areas

Object Nr.	Description	Type (**)	Co-ordinates (*)
Main Channel			
1	b	A	
2	b	A	
4	b	A	
415	4/10	A	
416	4/10	A	
417	4/10	A	
422	4/10	A	
213	10/	A	
111	c	A	
418	4/10	A	
210	10/	A	
219	4/10	A	
110	c	A/B	
6	b	A	
7	b	A	
35	W	A	
214	10/	A	
10	W	A	
212	10/	A	
216	10/	A/B	
420	4/10	A	

Object Nr.	Description	Type (**)	Co-ordinates (*)
Approach and Turning Areas			
112	W	A	
113	c	A	
114	c	A	
211	10/	A/B	
421	4/10	A	
424	4/10	A	
115	c	A	
13	W	B	
14	W	B	
217	10/	A	
426	4/10	A	
427	4/10	A	
428	4/10	A	
429	4/10	A	
430	4/10	A	
433	4/10	A	
434	4/10	A	
218	10/	A	
219	10/	A	
36	W	A	
221	10/	A	
National Fisheries Channel			
458	4/10	A	
459	4/10	A	
135	c	A	
234	10/	A	
134	c	A	

Object Nr.	Description	Type (**)	Co-ordinates (*)
National Fisheries Basin			
34	W	B	
39	W	A	
40	W	B	
235	10/	A	
465	4/10	A	

REMARKS

b = Collapsed beacon

c = Cluster

4/10 = Object between 4 and 10 m

10/ = Object over 10 m

W = wreck

Type (**) : This concept represents the estimated weight of objects without taking into account their location in the mudline.

The objects with an estimated weight less than 50 t are named "A" and those with an estimated weight greater than 50 t are named "B".

The mud suction and the cargo into the wrecks can imply a non-estimated extra weight.

Co-ordinates (*): To be translated by Neptun from UTM to geographical co-ordinates.

Data have been taken and estimated from Neptun's survey report.

The vagueness of some descriptions, dimensions or conditions of objects above and below mudline implies a possible deviation of the magnitudes estimated under the concept of type (see **).

ANNEX G: LIST OF OBJECTS TO BE REMOVED. PRIORITY II

The removal of wrecks and objects included in Priority II is not obliged by the schedule time and can be divided into several steps.

Every step will be decided by the Government in accordance with other works in the harbour area.

The following list includes only the wrecks and objects with an estimate weight over 50 t.

Object Number	Description
9	W
16	W
18	Dredger
23	W
25	W
27	W
29	W
31A	W
33	W
37	W
38	Cutter dredger
45	W
54	W

W = Steel wrecks

ANNEX H: STANDARD REQUEST FOR PROJECT PROPOSAL

The Ministry of Transport and Communication of Trinidad and Tobago invites you to submit an offer on a turnkey basis, for works and services, in accordance with the following articles:

1. Terms of reference
2. Scope of work
3. General conditions of the offer
4. Technical proposal
5. Priced proposal
6. Appendix

ARTICLE 1. TERMS OF REFERENCE

The work to be done concerns the removal of wrecks and objects in Port of Spain harbour, in Trinidad and Tobago.

ARTICLE 2. SCOPE OF THE WORK

The selected firm will carry out the work set forth in this article and will provide the personnel, equipment and other facilities required for the overall co-ordination and execution of the work.

NOTE: The Ministry of Transport and communication must specify here the work to be quoted by the tenderers in accordance with a list chosen by the Government. This list can be for instance, Annex F, Annex G or both.

ARTICLE 3. GENERAL CONDITIONS OF THE OFFER

3.1. SUBMISSION OF OFFERS

Offers shall be addressed to the Ministry of Transport and Communications before (to be defined by the Ministry).

3.2. LETTER OF CAPACITY

Tenderers shall, in a separate letter accompanying their tenders, furnish evidence showing their technical and financial capability to execute the proposed work.

3.3. VALIDITY OF THE OFFER

The validity of the offer will be, at least, of three months.

3.4. PAYMENT AND PRICE DETERMINATION

No remuneration will be made to tenderers for the preparation and submission of this offer.

Lumpsum prices quoted in the tender shall be firm. No price variation will be allowed, whether in cost of labour, material or other factors affecting prices of materials and services.

All prices must be quoted in US dollars for sake of cost comparison, but payments in other freely convertible currencies will be approved, as mutually agreed prior to the award of contract .

All prices included in the offer will have been obtained independently, without collusion with any competitor for the purpose of restricting competition.

No quoted prices included in the offer will have been knowingly disclosed directly or indirectly by the tenderer to any competitor prior to submission.

3.5. MEANS OF TRANSPORTING AND ACCESSING TO THE SITE

Firm tendering shall inquiry and satisfy itself as to the physical conditions prevailing at the site and as to the sufficiency of the means of transporting all materials, labour, power, water and any other matters or things required for or in connection with the works. It shall consider all other matters and possible contingencies affecting the execution, completion and maintenance of the works.

For tendering shall satisfy itself as to the nature of the existing roads or other means of communications, the access to and from the site and the loading and unloading facilities.

3.6. SITE AT DISPOSAL OF CONTRACTOR FOR HIS FACILITIES

While performing the Contractor's obligations, the Contractor will be granted by Ministry the free use of and adequate area of land and water as a temporary site for workyards, depots, etc.

Request for information pertaining to general, local and site conditions in the country must be directed to the Ministry.

The tenderers desiring site visits prior to the submission of an offer must submit a request to said Ministry for required arrangements.

Any visit by tenderer will be at his own expense.

3.7. INSURANCE

The contractor shall, at his own expense, obtain and maintain throughout the performance of the contract all insurance necessary and appropriate to project, such as:

- Workmen's compensation and liability insurance, including medical and hospitalization with respect to all personnel employed in connection with the contract.

- Equipment and any structure constructed or used under the contract.

- Public liability for death, bodily injury or damage to property arising from the acts or omissions of the contractor, his employees, agents or sub-contractors.

In consequence, the Ministry of Transport and Communications shall not be liable for or in respect of any damage, accident, injury or casualty in connection with the contract.

3.8. PENALTIES

The guaranteed time limit will be considered an important factor in the award of the contract.

Should the contract, due to his own deficiency, fail to finish the work within the guaranteed time, he shall be liable to pay to the Ministry of Transport and Communications for each week or part of a week's delay a penalty of zero point five (0.5) per thousand of the total contract price which shall be deemed to be the total price of the whole contract.

The limit of above penalties shall not exceed ten percent (10%) of the whole contract price.

3.9. CONTRACTOR'S ACCOMMODATION

The contractor shall make his own arrangements for offices and accommodations for his staff and labour.

3.10. ADDENDA AND REVISIONS

Addenda and revisions to the tender documents may be issued prior to the data of delivery of tenders for the purpose of clarifying the documents or to reflect modification in the design or contract terms. If person tendering is in doubt as to the true meaning of any part of the documents, he shall at once notify the Ministry and obtain clarification prior to delivering his tender.

3.11. LABOUR AND EQUIPMENT EXISTING FACILITIES

All necessary arrangements shall be made by the contractor for the provision of suitable skilled and unskilled labour and equipment required for the execution and completion of works. As far as possible

all labour both skilled and unskilled and equipment shall be engaged in Trinidad and Tobago. This circunstance will be considered as an important aspect of the proposal.

3.12. INSPECTION AND ASSIGNMENT

The tenderer agrees that employees of the Ministry and specialists, auditors or accounting firms designated by the Ministry shall have access to and right to examine, at any time during business hours, any books, documents, papers, records and all work in progress related to the contract.

The contractor shall not assign the contract or any part thereof or any benefit or interest therein or thereunder without the written consent of the Ministry.

3.13. DISPUTES, GOVERNING LAW

Any disputes related to the contract shall be referred to arbitration conducted in accordance with the rules then obtaining of the International Chamber of Commerce. Any such arbitration shall take place in a city to be agreed upon by the Ministry and the Contractor and, if they shall be unable to so agree, such arbitration shall take place in (to be defined by the Ministry).

The parties hereto agree to be bound by any arbitration award rendered in accordance with this section as the final adjudication of any dispute, and judgement on any such award may be entered in any court having jurisdiction.

3.14. CONFIDENCE DETAILS

The tenderer will treat the details of specifications and other tender documents as private and confidential.

ARTICLE 4. TECHNICAL PROPOSAL

4.1. GENERAL INSTRUCTIONS

The essential purpose of the technical proposal is to describe how the tendered plans to translate the description of what is needed in the project into a logical, acceptable methodology.

No price or cost data are to be included in the technical section of the proposal. However number of man-months or pieces of equipment must be indicated.

The proposal must present an outline of how the project will be approached, linking all the individual tasks, steps or phases into which the project as a whole should be logically divided. Estimated start and stop times and total man-months (if applicable) to accomplish work effectively must be detailed.

4.2. FORMAT AND SPECIFIC CONTENT

To aid in the evaluation of the proposals, it is desired that all proposals follow the same format. Therefore, your proposal must contain the information specified below in accordance with the following general format:

4.2.1. Table of Contents

List of tables and drawings if applicable.

4.2.2. Short Introduction and Summary

This section shall include an outline of difficulties anticipated in the project and delineate the general approach and methodology to be used in the conduct of the effort.

4.2.3. Technical Discussion of approaches

This section shall contain the major portion of the technical proposal. It should be presented in as much detail as necessary and contain the following:

. Specific statement of the proposed plan of operations, by task, steps or phases, major difficulties anticipated, if any.

. Principles and techniques which may be applied in the performance of the contract, and evaluation of the various methods considered with the substantiation of those selected. Indicate degrees of success expected.

. A logic planning is to be submitted which clearly shows the dependencies of each task, step or phase of work. The schedule shall begin the date of signing the contract and shall indicate the date upon which the works shall be completed.

. Complete detailed description of the function and responsibilities of all personnel involved in the work, including sub-contractors, if any.

. One technical approach must be selected as the prime proposal, but additional approaches may be presented.

4.2.4. Past Experience

General experience and background of tenderer on similar projects must be documented. Available specifications, photographs, technical descriptions of other data are welcome, and may be submitted to support the proposal in this area.

4.2.5. Designation of Project Manager

The tenderer will also be required to designate one of its officials as Project Manager at the tenderer's headquarters, whose responsibilities and functions shall be to coordinate all efforts with the Ministry to the handling of all substantive and administrative matters pertaining to the execution of the project.

The tenderer will also be required to designate one of its officials to serve as Team Leader, who shall represent the contractor on behalf of the Project Manager in the field.

4.2.6. Personnel

The tenderer shall ensure that his personnel are able to communicate effectively in the stated language as required and where necessary. He shall provide appropriate translation and interpretation services at no additional cost. This section shall identify specific main personnel to be assigned for task, step or phase on the project and identify their functions:

. Names and curriculum vitae backgrounds of all people who will be associated in a major way in the effort.

. Specific personnel (i.e. sub-contractors) with source from which they will obtain.

. Estimated man-hours for task, step or phases shall be included in this project.

4.2.7. Facilities and Equipment Data

This section should include a statement of available plant, equipment and test facilities proposed for use of this project.

. List of equipment required for the project. The equipment will be listed by categories in a decreasing form.

. Specific equipment sub-contracted with source from which they will be obtained.

. Estimated time needed for each category of the equipment in accordance with the planning of the whole work.

4.2.8. Job Termination

The tenderer must submit a method to confirm the complete finalization of removal for each wreck or object.

ARTICLE 5. PRICED PROPOSAL

To aid in the evaluation of the proposals, it is desired that all of them follow the same format, as applicable and possible. Each proposal must include all pertinent pricing details in accordance with an attached schedule of payments.

The proposal must contain as clear as possible the following information:

5.1. TABLE OF CONTENTS

5.2. SHORT INTRODUCTION AND SUMMARY

This section shall include an outline of the definitions, methodology, groups of work, etc used in the proposal.

5.3. RATES AND PRICES

This section shall contain the major portion of the proposal. It must be presented in as much detail as necessary and will be in accordance with the personnel and equipment proposed in Article 4.

The main chapters of this part of the proposal will be as follows:

5.3.1. Contractor's Personnel

For each task, step or phase defined in the technical proposal, the following will be detailed:

. Number of persons and their speciality.
. Man/hours to carry out the task, step or phase.
. Unit cost.
. Total cost.

5.3.2. Sub-Contractor's Personnel

The same data of the contractor's personnel including source or country from which they will obtaine.

5.3.3. Contractor's Equipment

For each task, step or phase defined in the technical proposal, the following will be detailed.

. List of equipment required.

. Time required to carry out the task, step or phase.

. Unit cost

. Total cost.

5.3.4. Sub-Contractor's Equipment

The same data as the contractor's equipment, including source or country from which they will be obtained.

5.4. MISCELLANEOUS COSTS

This chapter contains all the costs not considered in other chapters and the tenderer must take them into account to make the proposal on a turnkey basis.

This chapter should contain among others the following items:

. Subsistence if not included in the unit cost of personnel

. Transportation

. Insurance

, etc.

5.5. LUMPSUM PROPOSED

The tenderer will give the total firm price of the proposal on a turn-key basis.

5.6. TERMS OF PAYMENT AND FINANTIAL SYSTEM

The tenderer will propose his terms of payment and the available financial system.

ARTICLE 6. APPENDIX

In this article, the Ministry must include the charts and lists showing the objects the Government chooses to remove.

ANNEX J: LIST OF EXPERIENCED COMPANIES IN SIMILAR MARITIME WORKS

- BRODOSPAS

  Head Office: P.O. Box 110 Obala Lazareta 1, 58000 Split, Jugoslavia.

  Tel: 42-088 and 41-448. Telex: 26118 and 26185. Telegram: Brodospas Split.

  Director: Ivo Mateljan (Managing).

- BUGSIER REEDEREI UND BERGUNGS AG

  Head Office: Johannisbollwerk 10. 2000 Hamburg 11, West Germany.

  Tel: 31.12.81/86. Telex 021-1228/21. Telegram: Bugsier, Hamburg.

  Director: H.Von Berenberg-Gossler.

- CLYDE SHIPPING CO. LTD.

  Head Office: 78 Carlton Place. Glasgow G59TG. England.

  Tel: 041.429.2181. Telex 77623. Telegram Cumbrae, Glasgow.

  Director: Mr. J.B. Todhunter.

- FUKADA SALVAGE CO. LTD.

  Head Office: 9 Nishiki-Cho, Kanda, Tokyo, Japan.

  Tel: 03.2941951, Telex: J 24614. Telegram: Fukadasal, Tokyo.

  Director: Y. Saito

- HARMS SALVAGE GMBH & CO

  Head Office: Vorsetzen 54, 2000 Hamburg 11, West Germany.

  Tel: 040.31316. Telex: 0211058. Telegram: Magni, Hamburg.

  Directors: H.E. Borucki, A.V. Samson.

- LICENSINTORG

  Head Office: 113461, Kakhovka Str. 31. Moscow, URSS.

  Tel: 1220254. Telex: 7246. Telegram: Moscow, Licensintorg

  Director: V.D. Shibajev

- NEPTUN TRANSPORT & MARINE SERVICE AB

  Head Office: Tegeluddsvägen 92, Postal address: Fack, S-102 50 Stockholm, Sweden.

  Tel: 08.63 07 30. Telex: 10508. Telegram: Neptun, Stockholm.

  Directors: Stig Björn (Managing), Klas Peterson (Technical Manager), Inge Wernersson (Offshore Manager).

- NORTH BRITISH MARITIME GROUP, LTD.

  Head Office: King Willian House, Market Place, Hull HU1-1RB, England

  Tel: 224181. Telex 527692. Telegram:Towing Hull.

  Director: A.B. Wilbraham

- PACIFIC TOWBOAT & SALVAGE CO.

  Head Office: Pier D. Berth 35, Long Beach, Cal. 90802. USA.

  Tel: 213. 432.6487. Telex: 65-6339. Telegram: Pactow

  President: T.D. Opatz. Chairman of the Board. J.J. Turner

- PANAMA EUROPE OFFSHORE SHIPPING CO. INC.

  P.O. Box: 754, Willemstadt, Curaçao

- POLSKIE RATOWNICTWO OKRETOWE

  Head Office: Zwiazku Walki Mlodych Street 10, Gydnia, Poland

  P.O. Box 186. Tel: 216811. Telex: 054 239. Telegram: Polratok.

  Director: W.Babinski.

- SELCO SALVAGE, LTD.
  Head Office: c/o 1, Jalan Samulun, Jurong, Singapore 22
  Tel: 650177. Telex: 21352 RS 23393 Selsing. Telegram: Salvenger
  Directors: E.E. Kahlenberg (Chairman), Maj. W.H. Crafter (Deputy Manager), Manager Marine Division: A.Bond, Marketing Manager: M.F. Lindsell.

- SMIT INTERNATIONALE NV
  Head Office: Zalmstraat 1, 3016 DS Rotterdam, Holland
  Tel: 010.148.100. Telex: 27162. Telegram: Smittug Rotterdam.
  Postal address: P.O. Box 1042, 3000 BA Rotterdam
  Managing Directors: P.E.E. Kleyn van Willigen, R.W. Scheffer, B.J. Amesz.

- EM.Z. SVITZERS BJERGNINGS-ENTERPRISE A/S
  Head Office: 1 Kvaesthusgade, DK-1251 Copenhagen K, Denmark.
  Tel: 01-155195. Telex: 15983. Telegram: Svitzersalvage.
  General Manager: Jørn Hansen.

- WIJSMULLER BV
  Head Office: Sluisplein 34. P.O. Box: 510, 1970 AM Ijmuiden, Holland
  Tel: 02550-19010. Telex: 41110. Telegram: Wijsmuller Ijmuiden
  Directors: J.F. Wijsmuller, P. de Vilver.

The afore-mentioned information has been taken from our 1980 files.

ANNEX K: INFORMATION ON STANDARD TYPE OF EQUIPMENT

Salvage is a type of work which does not admit an equip. standardization because each case, at least in theory, requires a different equipment.

However, the specialized firms in this kind of work have selected through its experience some equipment which, together with its own technology and a good planning, assure better results.

Floating cranes of great lifting capacity and deck cargo barges are the most sophisticated equipment although electronic devices of high precision are also used.

It is not possible to speak on standard equipment, but in the following items some examples are mentioned:

A) Floating cranes

- Medium size: Lifting capability ..... abt. 200 t
- Big size : Lifting capability ..... abt. 400 t

Important point: These equipment must be prepared to work with hook or crab, indistinctly.

B) Deck cargo barges

- Medium size: 34 x 18 x 3 m and 500/800 t on deck
- Big size : 90 x 20 x 6 m and 2000/6000 t on aeck

C) Positioning systems

The techniques used to determine positions at sea include electronic, acoustic, laser and visual systems. Each system has its particular applications and limitations. The most commonly used technique is the electronic. Laser and visual systems are limited to line of sight surveys; thus, applications are limited to near shore areas.

Instruments using these techniques will be now discussed.

- Baseline measuring equipment

A Tellmometer or Distomat apparatus is used for major triangulation baseline measurement, trilateration or transversing over difficult areas. The apparatus is a microwave electronic measuring system giving an accuracy of three parts in a million.

- Radio position fixing equipment

Where radio position fixing equipment is required, the type used will depend on the offshore distance, geographical layout and licence regulation. Equipment include Toran, Hydrodist and Trisponder. The system is essentially a long range phase measuring in circular mode, in which each position is calculated by trilateration from two or three shore stations, each one consisting of a transmitter driven by a subsidiary frequency standard. On board, the mobile receiver is also controlled by a similar frequency standard.

- Magnetometer

The Esloc Proton Magnetometer is used to detect wrecks, iron obstruction or buried metal objects.

- Side Scan Sonar

In order to detect wrecks or other obstruction between sounding lines, or to obtain indications of the necessity of surveying to a large scale, the oblique sonar is used. This equipment also records the sound wave informations, bottom features such as rock outcrops and the presence of submarine objects.

D) Underwater cutting equipment

Underwater cutting equipment must be strong but of easy use with a fast piercing operation, high stability of the flame and starting or extinguishing with easy regulator.

The installation consists of three parts:

- Control and gas regulation box

Control and gas regulation box is installed in an auxiliary boat. Its weight according to the types is about 15-20 kg without gas bottle.

- Torche and flexible hoses

The torche is handled by divers and is connected to the control

and gas regulation box by means of flexible hoses.

Control and gas regulation box allows to keep the heating flame of equal length at any depth. It facilitates the diver's work who must only maintain the equipment in position and move it in the required cutting direction.

The torche has three gas inlets: one of oxigen for heating; other of oxigen for cutting and the third one for acetylene or propane, according to desired gas.

Gas supplies are regulated from the control box for which the torche handling does not required any skilled knowledge.

Maximum cutting thickness is about 100 mm and the consumption of gases varies according to type of work.

E) Auxiliary equipment

The auxiliary equipment consists of:

. Motorboat
. Signal buoys
. Slings
. Shackles, eyebolts
. Mud pumps
. Air-compressed equipment
. Water jet equipment
. Diving standard equipment

. Underwater lighting

. Manual tools

All the afore-mentioned auxiliary equipment must be selected by the Contractor for the operation planning design.

ANNEX L: GENERAL ESTIMATE OF WORK DURATION

This report has been laid to emphasize the need to perform clearance and removal of wrecks from Port-of-Spain harbour in co-ordination with the plans of harbour expansion.

Thus, two levels of priority have been suggested:

. Priority I. Annex F - Listing of objects which interfere or might interfere with the now dredged navigation ways and the removal of which is urgent to get the full capacity of operation of harbour.

. Priority II. Annex G - This covers the rest of objects to be cleared up. Bearing in mind that they do not interfere with a ruled navigation through dredged areas, this priority can be performed in future stages, according to harbour expansion plans. This stage can be broken up into several series as per the new work of harbour.

In this Annex we limit the general timing foreseen for the works to be performed in Priority I. This phase is the one which now is completely defined, and its performing, urgent.

As a guideline, the estimated values would be the following:

. Estimate as per Neptun proposal	.....	74 days
. Estimate based on this report	.....	64 days

The afore-said referred to the listing of objects mentioned in Annex F.

If the estimate is referred to the whole work, its values would be as follows:

- Area A (KARLSKRONAVARVET AB's letter 12th June, 1980)

  . Estimate as per Neptun proposal ..... 144 days
  . Estimate based on this report ..... 134/126 days

- Hazards to Navigation

  . Estimate as per Neptun proposal ..... 65.5 days
  . Estimate based on this report ..... 61 days

As far as costs are concerned, it is not possible to make valid estimates showing the advantages of focusing the problem in phases or step by step. Nevertheless, it seems very clear that this operating procedure can reduce the initial costs and the total amount to pay in foreign currency.

Furthermore, the procedure allows for training of local personnel which will be necessary in the future to carry out the Priority II.

Only as a guideline, a figure in the range of US$ 2-2.5 million should be necessary to spend on removal of objects included in the short list of Priority I. Annex F.

ANNEX M: AVERAGE RATES FOR GENERAL TYPES OF WORK

The concept of average rates suggests a statistical value taken from a series of equal or similar jobs.

In this particular case of the clearing up of Port of Spain harbour, this concept cannot be applied because the work is unusual and unrepeatitive, and we are unable to give a representative series of equal works to reach an average value.

Within the context defined by the Survey Report and taking into account the Neptun equipment selected in its offer, the prices levels have been commented in Chapter 5.5.

However, the Trinidad and Tobago Authorities insisted, in the meeting held with the Mission, and it was agreed in the preliminary report, that the final report would include some rates for orientation purposes. In this way, the following rates are indicated:

	Rate ($/day)
. Floating crane, lifting capacity 400 t	13,000
. Submersible barge with reinforced deck (2000 t cap)	2,000
. Tugs over 700 HP	1,500
. Divers assistance (with normal equipment)	300
. Repair and maintenance	2,5% (*)
. Administration fee	5% (*)
. Management fee	10-15% (*)

The rest of aspects of this type of jobs has a majority-local-component, and as a consequence, their costs can be better analized by the Trinidad and Tobago Authorities, themselves.

(*) % on the offer total amount.