ANTIQUARIA

A REPLICA OF THE SHIPWRECKED SPANISH MANILA GALLEON

NUESTRA SENORA del PILAR de SARAGOSA y SANTIAGO

COCOS LAGOON, MERIZO, GUAM

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January 8, 1992

Mr. Peter P. Leon Guerrero
Director, Bureau of Planning
P.O. Box 2950
Agana, Guam 96910

Re: Proposal for Antiquaria, a Replica of the Shipwrecked Spanish-Manila Galleon, the Nuestra Senora del Pilar de Saragosa y Santiago, to be placed in Cocos Lagoon

Dear Mr. Leon Guerrero;

We are requesting a Guam Coastal Management Program (GCMP) review for the proposed Antiquaria project. The goal of the project is to establish ecotourism as a viable resource on Guam. None of Guam's past development has focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities - for the citizens of Guam, tourists, and professionals alike. The proposed Antiquaria does just that - and the project is designed to preserve and enhance, rather than harm, the natural environment. The proposed project is to establish a replica of the 17th century galleon Pilar's wrecksite at a safe location within Cocos Lagoon. The wrecksite would be used as a facility for training students in marine archaeology and as field assistants for the Pilar salvage project, as a tourist attraction, and as an educational tool for Guam's youth - to provide a realistic glimpse of the island's heritage, and for creating environmental awareness.

Enclosed for your review is the GCMP Federal Consistency application. Also enclosed for your information are the project proposal, project maps and drawings, the Environmental Impact Assessment, a copy of the U.S. Army Corps of Engineers application, a copy of the Guam DRC/TSPC application, a copy of the Guam Environmental Protection Agency 401 Water Quality Certification request, and a copy of the U. S. Coast Guard Private Aids to Navigation application.

Please review the enclosed information and address your findings to the Army Corps of Engineers at the address below, with a copy to this office.

Mr. Frank M. Dayton
Chief, Guam Operations Office
Department of the Army, Corps of Engineers
238 Archbishop F. C. Flores Street
Agana, Guam 96910

If you have any questions or desire additional information, please do not hesitate to contact me.

Sincerely,

Jan Mansfield

Jan Mansfield,
Project Engineer

GUAM COASTAL MANAGEMENT PROGRAM
ASSESSMENT FORMAT

DATE OF APPLICATION: January 8, 1992

NAME OF APPLICANT: James Cruz & John Bent, Antiquaria Guam Ltd.

ADDRESS: P.O. Box 1649, Agana, Guam 96910

TELEPHONE NO. (671) 477-3681

TITLE OF PROPOSED PROJECT: Antiquaria

COMPLETE FOLLOWING PAGES

FOR BUREAU OF PLANNING ONLY:

DATE APPLICATION RECEIVED: _____

OCRM NOTIFIED: _____ LIC. AGENCY NOTIFIED: _____

APPLICANT NOTIFIED: _____ PUBLIC NOTICE GIVEN: _____

OTHER AGENCY REVIEW REQUESTED: _____

_____

_____

DETERMINATION: ( ) CONSISTENT ( ) NON-CONSISTENT ( ) FURTHER INFORMATION REQUESTED

OCRM NOTIFIED: _____ LIC. AGENCY NOTIFIED: _____

APPLICANT NOTIFIED: _____

ACTION LOG:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

DATE REVIEW COMPLETED: _____

GUAM COASTAL MANAGEMENT PROGRAM
ASSESSMENT FORMAT

DEVELOPMENT POLICIES (DP):

1. Shore Area Development

Intent: To insure environmental and aesthetic compatability of shore area land uses.

Policy: Only those uses shall be located within the Seashore Reserve which:
- enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
- can demonstrate dependence on such a location and the lack of feasible alternative sites.

Discussion: The proposed Antiquaria will replicate an existing unique treasure of Guam (from hazardous waters outside Cocos Lagoon) and relocate it within the safer, protected waters of Cocos Lagoon. Then all visitors to the replica will experience the thrill of encountering a shipwrecked Spanish tresure galleon underwater within the rich marine setting of Cocos Lagoon. Genuine artifacts from the real shipwreck will be placed on the replica shipwreck. A brief lecture on the history of the shipwreck and the marine life will educate visitors before their underwater adventure. Hopefully visitors will leave with an enhanced respect for both Guam's history and beautiful, but sensitive, marine life.

2. Urban Development

Intent: To cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.

Policy: commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within urban districts as outlined on the Land Use Districting Map.

Discussion: The proposed Antiquaria will be an historical and marine-life museum with commercial applications. It will not increse the residential patter of nearby Merizo. It is planned to attract tourists who will already be visitin Cocos Island Resort. In addition, local families, civic groups, and school groups will be given free tours with advance appointment. The development is independent of the local infrastructure. A pontoon-style boat will be utilized at the wrecksite for lectures, security, and maintenance. The boat will have a generator and restroom equipped with a U.S. Coast Guard approved marine sanitation device. Fresh drinking water will be taken to the site in containers. Therefore, there will be no impact to the infrastructure.

DP 3. Rural Development

Intent: To provide a development pattern compatible with environmental and infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.

Policy: Rural districts shall be designated in which only low density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewering is provided.

Discussion: The proposed Antiquaria will be independent of the local infrastructure. The replica project will not increase the population of nearby Merizo, Umatac, and inarajan. It will provide employment for 15 people from the area.

The majority of tourists expected to visit the site will be tourists coming to Cocos Island Resort, as part of the resort's day-recreation bus tours. Traditional lifestyle patterns will not change due to the proposed Antiquaria.

4. Major Facility Siting

Intent: To include the national interest in analyzing the siting proposals for major utilities, fuel and transport facilities.

Policy: In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, the Territory shall recognize the national interest in the siting of such facilities including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.

Discussion: The proposed development will not be a major utility, fuel and transport facility.

DP 5. Hazardous Areas

Intent: Development in hazardous areas will be governed by the degree of hazard and the land use regulations.

Policy: Identified hazardous lands, including floodplains, erosion-prone areas, air installations, crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.

Discussion: Cocos Lagoon is not a hazardous area except during typhoon conditions. No swimming, snorkelling, or SCUBA shall occur during dangerous wave or current conditions. During typhoons the valuable artifacts on the shipwreck replica will be removed and the pontoon-style boat will be taken to a safe harbor.

6. Housing

Intent: To promote efficient community design placed where the resources can support it.

Policy: The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and man-made hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

Discussion: The population of the Village of Merizo will not grow due to this development, nor will lifestyles change. The Village can identify with the shipwreck heritage. Also economic ventures are available to village entrepreneurs to develop such concessions as glass-bottom tour boats and/or snorkel and SCUBA boat tours. In addition, approximately 15 employees from the Merizo, Umatac, Inarajan communities will be needed.

DP 7. Transportation

Intent: To provide transportation systems while protecting potentially impacted resources.

Policy: The Territory shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries and other coastal resources.

Discussion: The existing Cocos Island Resort pier and Merizo public pier can adequately handle boat tours to Antiquaria. Tour boats from Agat and Apra can also visit Antiquaria. No new shore facilities are necessary.

8. Erosion and Siltation

Intent: To control development where erosion and siltation damage is likely to occur.

Policy: Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land use districting guidelines, as well as other related land use standards for such areas.

Discussion: No erosion or sedimentation will occur. During construction, placement of the support beams will displace some sand but this sand will settle quickly due to the small bottom current at the site.

RESOURCES POLICIES (RP):

1. Air Quality

Intent: To control activities to insure good air quality.

Policy: All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.

Discussion: The only air polluting device will be the diesel engines on the pontoon-style boat. The engines will be equipped with filters and mufflers and be Coast Guard inspected and approved. The engines will not be operating at all times.

2. Water Quality

Intent: To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.

Policy: Safe drinking water shall be assured and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuarine, reef and aquifer areas.

Discussion: The only water polluting device will be the toilet facility. This will be a completely self-sustained marine sewage dveice with sanitary waste storage tanks. The storage tanks shall be pumped empty on a regular basis by a qualified wastewater pump truck contractor. No sewage will be emptied into the lagoon, under any circumstances.

RP 3. Fragile Areas

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

Policy: Development in the following types of fragile areas shall be regulated to protect their unique character.

- historical and archeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- mangrove stands and other wetlands

Discussion: The site is not a historical or archeological site nor is it a limestone forest, mangrove stand, or wetland. It is a marine community. At present it is a mostly, bare sandy bottom. The placement of the replica shipwreck is designed to provide greater habitat for marine life. It is the goal of the development to promote a varied marine environment for education, enjoyment, and respect of the visitors to the site.

The project is low-scale and ecotourist in nature.

4. Living Marine Resources

Intent: To protect marine resources in Guam's waters.

Policy: All living resources within the territorial waters of Guam, particularly corals and fish, shall be protected from over harvesting and, in the case of marine mammals, from any taking whatsover.

Discussion: The design of Antiquaria has mapped existing corals and rocks. All corals and rock will remain undisturbed. In addtion, vistors will be supervised to ensure no fishing or taking of coral is allowed.

RP 5. Visual Quality

Intent: To protect the quality of Guam's natural scenic beauty.

Policy: Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways and trails.

Discussion: The project is not visible from above water. It is important to maintain the cleanliness and pristine habitat of the site. For that, the pontoon-style boat will stay at the site at all times with three 8-hour shifts of security personnel. The pontoon-style boat will be a new boat and will be maintained clean so that it will be visually inviting to tourists. The Village of Merizo will be asked to provide their input into the design of the pontoon-style boat. The boat will barely be visible from the shoreline, as the site is approximately 1 mile from the nearest shore.

6. Recreation Areas

Intent: To encourage environmentally compatible recreational development.

Policy: The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife and marine conservation areas, scenic overlooks, parks and historical sites.

Discussion: The proposed Antiquaria will allow vistors a chance to experience the beautiful and unique Cocos Lagoon as well as feeling and understanding the influence of the Spanish trade era on Guam from the history surrounding the shipwreck of the Pilar. And one of the world's most exciting shipwreck discoveries with its important and rich salvage will be displayed in a setting that shows Guam's greatest natural beauty.

RP 7. Public Access

Intent: To ensure the right of public access.

Policy: The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all Territorial recreation areas, parks, scenic overlooks, designated conservation areas and their public lands; and agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.

Discussion: The site will be available for free to local residents of Guam. A pre-arranged appointment is necessary, however, so as to not overload the site with boats and swimmers. To provide security for the artifacts, to keep the area clean and well-maintained, and to protect the marine life that develops in the area, a submerged land lease will be necessary.

The site is 1.5 acres in size, which is roughly 00.06% of Cocos Lagoon (2,600 acres). The site is not in a prime fishing location and is not in the navigable channel. It was selected to have the least impact and importance to the local community, yet have clear underwater visibility, sandy bottom, and safe currents for novice swimmers, snorkellers, and SCUBA. It will be free and accessible to Guam residents, but must also exercise some control for maintenance, safety, and security.

8. Agricultural Lands

Intent: To stop urban types of development on agricultural land.

Policy: Critical agricultural land shall be preserved and maintained for agricultural use.

Discussion: No agricultural land will be used.

FEDERAL CONSISTENCY
SUPPLEMENTAL INFORMATION FORM
Date: January 8, 1992

Project/Activity Title or Description: Antiquaria
A Replica of the shipwrecked Spanish-Manila galleon, the Nuestra Senora del Pilar de Saragosa y Santiago

Location: Cocos Lagoon, Merizo, Guam

Other applicable area(s) affected, if appropriate:

Est. Start Date: May 1992 Est. Duration: 3 months

APPLICANT

Name & Title: James Cruz & John Bent
Agency/Organization: Antiquaria Guam Ltd.
Address: PO Box 1649, Agana, Guam
Zip 96910

Telephone No. during business hours:
A/C ( ) (671) 477-3681
A/C ( )

AGENT

Name & Title: Jan Mansfield
Agency/Organization: O'Neill Mansfield Engineers
Address: PO Box 4314, Agana, Guam
Zip 96910

Telephone No. during business hours:
A/C ( ) (671) 646-2400
A/C ( )

CATEGORY OF APPLICATION (check one only)

( ) I. Federal Activity
( ) II. Permit or License
() III. Grants & Assistance

TYPE OF STATEMENT (check one only)

( ) Consistency
( ) General Consistency (Category I only)
( ) Negative Determination (Category I only)
( ) Non-Consistency (Category I only)

APPROVING FEDERAL AGENCY (Categories II & III only)

Agency _____
Contact Person _____
Telephone No. during business hours:
A/C ( ) _____
A/C ( ) _____

FEDERAL AUTHORITY FOR ACTIVITY

Title of Law _____
Section _____

OTHER TERRITORIAL APPROVALS REQUIRED

Agency	Type of Approval	Date of Applic.	Status

PROPOSAL

FOR

REPLICA GALLEON WRECKSITE

COCOS LAGOON

GUAM

PROPOSAL FOR A REPLICA GALLEON SHIPWRECK SITE WITHIN COCOS ISLAND LAGOON, GUAM

INTRODUCTION

Development on Guam has progressed at an unprecedented pace over the past 5 years. The impact of development on the island, particularly tourism-related development, is evident in virtually all sectors of the local economy. Even so, none of the present development has focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities - for the citizens of Guam, tourists, and professionals alike. The proposed Pilar Project does just that - and the project is designed to preserve and enhance, rather than harm, the natural environment.

The Nuestra Senora del Pilar de Saragoza y Santiago, a Spanish Galleon, was shipwrecked off Cocos Island on 2 June 1690, on a voyage from Acapulco to the Philippines. The wreckage has been located, and a permit to conduct an archaeological excavation of her has been issued by the Government of Guam. The planned operation stimulated a cooperative agreement between the Government of Guam, the University of Guam, and the permit holder to use this unique opportunity to help establish a marine archaeological program at the University - a program which would not only train aspiring marine archaeologists, but also help rediscover the island of Guam's legacy and project it into the present.

The initial thoughts were to construct a replica of the wrecked Galleon, and place it within the protected waters of Cocos lagoon, where students could learn and practice their skills under safe conditions. It was evident during the project's early planning stages that educational and general interest in the shipwreck were widespread. It was then decided to revise the plan to encompass a much broader spectrum of interests, one which would utilize a unique asset for broader educational opportunities and local business development; all of which would highlight a greater awareness of Guam's past and appreciation for Guam's natural environment.

PROPOSED PROJECT

The proposed project is to establish a replica of the 17th century galleon Pilar's wrecksite at a safe location within Cocos Lagoon. The wrecksite would be used as a facility for training students in marine archaeology and field assistants for the Pilar project, as a tourist attraction, and as an educational tool for Guam's youth -to provide a realistic glimpse of the island's heritage and for creating environmental awareness.

CONCEPT OF THE SITE

The general vicinity of the replica shipwreck within Cocos Lagoon is shown on the following page. That vicinity is a sandy bottomed area bounded by coral reef. The wreck would be situated where the depth would not exceed 20 feet at high tide. The wrecksite would not be affected by surge or swells and could be dived or snorkeled on in almost any weather conditions except typhoons. Navigational coordinates of the exact site would be provided.

The area of the wrecksite would be approximately 250 feet by 150 feet. No part of the replica would rise more than 6 feet off the bottom. The state of the replica would simulate how the actual wreckage would have appeared after 50-100 years underwater.

The site would consist of:

- **replica hull timbers**; parts of the keel and ribs of the vessel
- **portion of the stern castle and fore castle**
- **ballast stone pile**
- **replica canons and anchors**
- **representative artifacts placed among the wreck**
  nails, spikes, musket balls, Spanish helmets, chests of coins, etc.

Construction and layout would be carried out to ensure that the replica simulates as closely as possible the wreckage of a typical 17th century galleon. Hull timbers will be designed and treated to simulate underwater ageing. Replica cannon would be cast in concrete then coated with iron, or perhaps bronze, so they appear as realistic as possible, and so that, over time, marine organisms would settle, attach, and proliferate. Anchors and other items would be fabricated in a similar manner. Clean worn river-rock would be used for the ballast stone pile. A range of common artifacts such as pottery, porcelain, fragments of glassware, cannon shot, and a variety of ship's fittings would also be attached to the wreck.

The wreck design would, as much as possible, incorporate features learned from artificial reef design to enhance the wreck's attraction of fish fauna. The wrecksite would be set up as an underwater park. The actual layout would spread the wreck along the seabed in a manner conducive to establishing an underwater trail, with placards describing specific artifacts and ship's structures at points of interest along the trail.

R. Duncan Mathewson III, Pilar Project Director of Archaeology, will supervise the construction and layout of the Cocos Lagoon wrecksite. Mr. Mathewson has worked extensively on marine archaeology projects on Spanish shipwrecks off Florida and in the Caribbean, and is recognized as a leading authority on the subject.

WRECKSITE ACTIVITIES

The replica wrecksite affords a way to highlight Guam's unique island heritage and natural environmental in way that combines enjoyment, educational, and training opportunities. It would also serve to stimulate small-business opportunities for local citizens.

Archaeological Education and Training Activities

The Pilar Project, the Government of Guam, and the University of Guam have cooperatively agreed to try and establish a marine archaeological program at the University. The replica wrecksite, located in a shallow safe area, could serve as a training ground for students and field assistants, many of whom may have little or no previous diving experience.

Students could learn necessary practical working skills and gain diving experience in a safe, controlled, location before being exposed to a genuine wrecksite. Most wrecks, like the Nuestra Senora del Pilar are situated in exposed positions on seaward reef slopes where they are swept by currents, surge, and surf. Such situations are tricky, even for experienced divers, who are expected to cope with conditions and at the same time carry out the archaeological tasks assigned to them.

The wrecksite would be suitable for the following specific training exercises:

- **site surveying techniques** - manual tape and baseline, plane table, etc;
- **electronic survey techniques** with hand-held position-fixing equipment;
- **photo mosaic exercises** using stereo photographic techniques;
- **grid survey techniques** - assembly/disassembly and survey alignment of plastic and aluminium grids;
- **recording techniques** of structures and artifacts within the grid system;
- **excavation techniques** ranging from brush and dentist probe techniques to airlifts and dredges;

- **small-scale recovery exercises** of various sized objects from the seabed.

The wrecksite would be suited for a variety of other studies as well; biological studies such as patterns of fish and coral recruitment from the nearby seagrass beds and barrier reef of Cocos lagoon.

General Education: Historical and Environmental Awareness

The salvage of the Pilar emphasizes Guam's unique heritage. The shipwreck site would offer Guam's school children the chance to get a life-like glimpse of that heritage and develop a greater environmental awareness. The Pilar project strongly believes that children are the resource of Guam's future. The Pilar project would offer to set up a program for Guam's schools. The general educational program would augment routine classroom work with a fascinating glimpse of Guam's 17th century history.

Students would be exposed to the concepts of and practice of marine archaeology. A visit to the site, with a supervised snorkeling excursion (or a glass-bottom boat tour for non-swimmers) to view archaeological training of project staff, could be included in the history curriculum modules for years four through twelve. The wrecksite visit would include an audio-visual presentation on the Pilar project, pitched at the appropriate level of the school class involved.

Educational and training programs at all levels will assist all of Guam's citizen's rediscover a vibrant period of the island's historical past.

TOURISM

The replica shipwreck site would offer a variety of benefits as a tourist attraction and would capitalize on an aspect unique to Guam. Umatac was the only port of call for Spanish galleons voyaging between Manila and Mexico.

We intend to conduct briefings and tours of the actual wrecksite of the Pilar for experienced tourists/divers, but there is a vast market of tourists whose water skills are limited to snorkeling, but who would be very interested in a marine archaeology experience in safe conditions.

The Cocos Lagoon site would offer that experience. A package consisting of a Pilar project briefing and a snorkeling tour of the replica wrecksite, supervised by experienced guides, would have considerable appeal. This could be coordinated with archaeological training at the site so that tourists could view students at work. Glass-bottom boats would open up the experience to people who are unable to swim or snorkel. We believe that a vast audience exists among the general public, who have some exposure to marine archaeology through TV documentaries, books, and magazines. The tours and activities

we are proposing would tap that interest and give those people an experience that they would find difficult, if not impossible, to match anywhere else in the world.

There is also a strong market for specialized dive tours. Diver training groups, like PADI, have specialist qualifications which include Wreck Diver and Marine Archaeology endorsements. Courses for both of these could be offered using the Cocos Island wrecksite and other of Guam's underwater attractions for each activity. The wrecks of Apra Harbor provide ideal and varied venues for a Wreck Diver module, while the Pilar project is the ideal venue for the other module.

All tourist activities could be conducted in cooperation with Guam hotel and resorts. Naturally, all activities could be done on a bilingual basis in English and Japanese.

Local Employment and Business Opportunities

The concept would generate local employment and small business opportunities, and would be a tangible demonstration of bringing marine archaeology into the realm of the public.

The Pilar project's intention is to provide a safe, interesting, well organized, professionally operated and maintained tourist attraction. The project would employ some local labor during the construction - layout period, and offer local employment opportunities as guides and instructors once the wrecksite became operational.

It is not the Pilar project's intention to establish transport businesses such as glass-bottom boat cruises or tourist-oriented diving or snorkeling operations. However, we feel that wrecksite will create those employment/business opportunities for other members of the local community. The size and scale typical of those types of operations make it possible for enterprising citizens to start businesses for only a limited capital investment. The replica wrecksite which captures Guam's unique historical past, would provide local small-scale businesses with a profit making opportunity.

Additionally, most of Guam's development is concentrated in the population centers of Tumon and Tamuning. The employment and small-business opportunities that the Pilar project would generate would be suitable for residents of Guam's southern villages. Furthermore, those opportunities would be ones which would not disrupt or unfavorably alter the village lifestyle. The structure itself would be underwater, all except for the lecture and tour staging area (a pontoon raft of some sort), so neither would it destroy the aesthetics of Cocos Lagoons natural appearance.

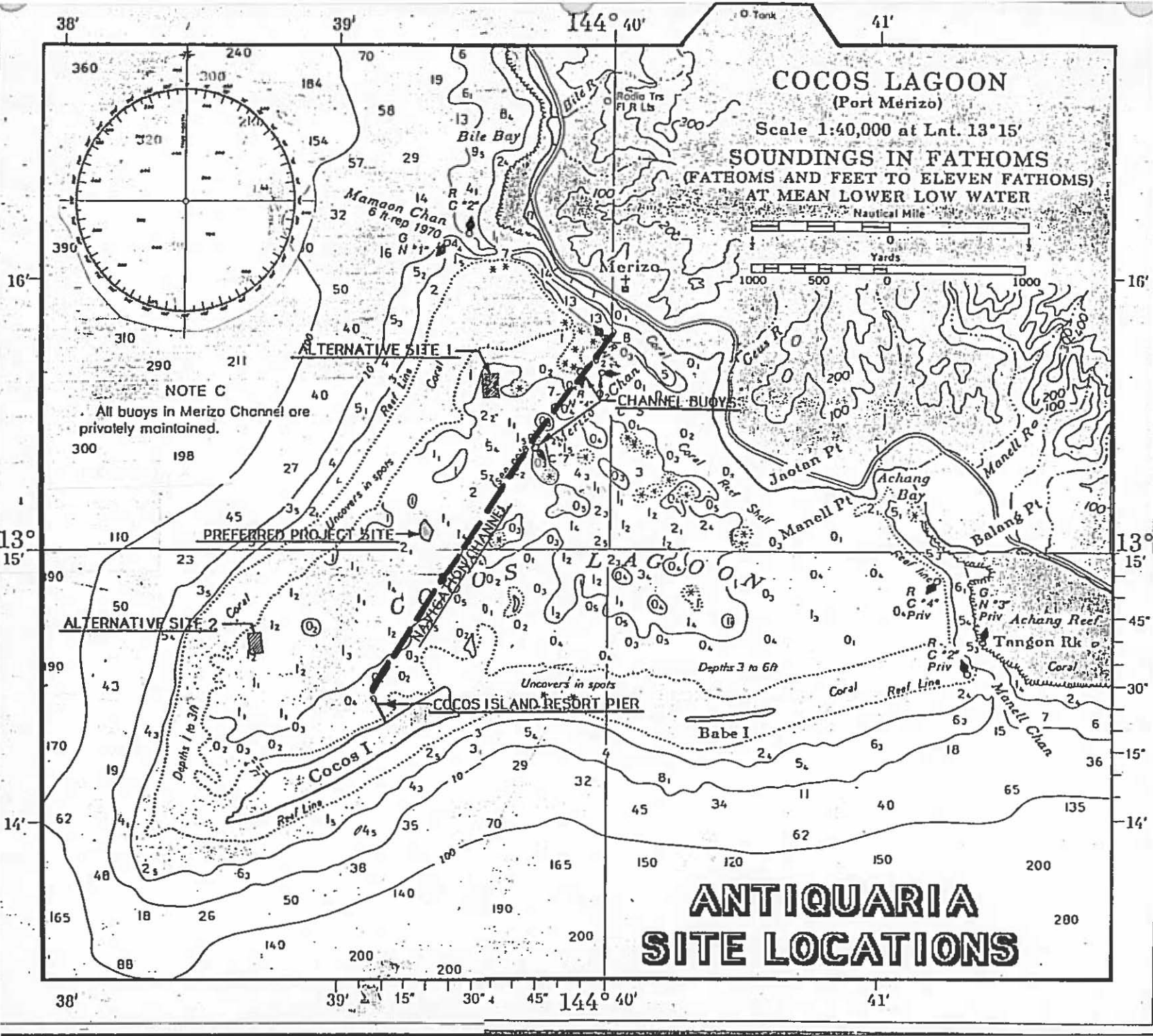
ENVIRONMENTAL IMPACT

It can be argued that placing an artificial structure of any kind in Cocos Lagoon will have some impact on the surrounding environment. We believe that the structure will behave in the same manner as a genuine shipwreck, and that over time it will attract algal, coral, fish communities. There structure may alter tidal and current flows slightly, but we believe that the impact to the area would be minimal. We are willing to work with faculty from the Marine Laboratory at the University of Guam to ensure that the structure will have minimal or no negative environmental impacts. Furthermore, we plan to take great care in constructing the replica so that the marine environment will not be exposed to any toxic or hazardous materials. Around the world it's evident from scores of wrecks from this era, that such a site generally enhances the surrounding marine environment by acting as an artificial reef and attracting marine life. This phenomena is particularly well documented when artificial structures are located in relatively barren areas.

A REPLICA GALLEON WRECKSITE IN COCOS LAGOON WOULD:

- Rejuvenate interest in Guam's heritage and unique historical past
- Establish Guam as a unique destination for study and tourism
- Be an asset for historical education and for increasing environmental awareness
- Assist development of marine archeaology studies at the University of Guam
- Provide a stimulating educational opportunity for Guam's school children
- Provide local employment and small-scale business opportunites for people in the southern part of Guam compatible with village lifestyle
- Would have minimal negative environmental impact
- Would not negatively alter the natural beauty of Cocos Lagoon


ANTIQUARIA PROJECT LOCATION


COCOS LAGOON
(Port Merizo)
Scale 1:40,000 at Lat. 13°15'
SOUNDINGS IN FATHOMS
(FATHOMS AND FEET TO ELEVEN FATHOMS)
AT MEAN LOWER LOW WATER
Nautical Mile
Yards
NOTE C
All buoys in Merizo Channel are privately maintained.
ALTERNATIVE SITE 1
ALTERNATIVE SITE 2
PREFERRED PROJECT SITE
CHANNEL BUOYS
COCOS ISLAND RESORT PIER
Merizo
Bile Bay
Bile R.
Mamaon Chan
Cocos I
Babe I
Jnoton Pt
Manell Pt
Achang Bay
Balang Pt
Manell Chan
Tangon Rk
Achang Reef
Uncovers in spots
Depths 3 to 6ft
Depths 1 to 3ft
Reef Line
Coral
ANTIQUARIA
SITE LOCATIONS

ENVIRONMENTAL IMPACT ASSESSMENT
for
A Replica of the Shipwrecked Spanish Manila Galleon
Nuestra Senora del Pilar de Saragosa y Santiago
Cocos Lagoon
Merizo, Guam

Prepared for
ANTIQUARIA GUAM, LTD.

Prepared by
Pacific Basin Environmental Consultants, Inc.

January 1992

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LIST OF PHOTOGRAPHS

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I. DESCRIPTION OF PROJECT AND PERMIT REQUIREMENTS

A. PROJECT DESCRIPTION

1. General

A 17th century Spanish Galleon, the Nuestra Senora del Pilar de Saragoza y Santiago, was shipwrecked off Cocos Island on June 2, 1690, on a voyage between Acapulco and the Philippines. The wreck was located and a permit to conduct archaeological excavation of the site has been issued by the Government of Guam.

Antiquaria Guam, Inc. has developed the proposed project to build and place a replica of the shipwrecked galleon at a pre-defined location in Cocos Lagoon (Figure 1). Similar to an actual shipwreck, the replica galleon will be laid out in three separate pieces: a section of the bow hull, a section of the stern hull, and a large section of the sterncastle (Figure 2). The construction and layout of the replica galleon will be designed to simulate, as much as possible, the wreckage of a typical 17th century galleon, including ageing of the replica, and the scattering of various artifacts expected to be found at such an underwater wrecksite. A significant amount of genuine artifacts will be included in the project, so that the site will, in effect, be an underwater museum. The wrecksite will be used as a facility for training students in marine archaeology, as a museum for much of the larger and less valuable artifacts from the genuine shipwreck, as a tourist attraction, and as an educational tool for Guam's youth - to provide a realistic glimpse of the island's heritage and to create environmental awareness.

As part of the project, a museum/gift shop/information booth will be located on Cocos Island. The space for this shop will most likely be leased from the Cocos Island resort. It is not the intention of the developer to establish a transportation business, boat cruises/tours or tourist-oriented SCUBA diving or snorkeling operations. It is envisioned that, to a large extent, this project will tap into the tourist market for the Cocos Island resort, and that the transportation and diving functions will be part of a larger Cocos Lagoon tour package. It is also envisioned that the transportation, diving, and other similar employment/business opportunities will be fulfilled by entrepreneurs from the local community. The size and scale of these types of operations make it possible for small businesses to develop with limited capital investment.

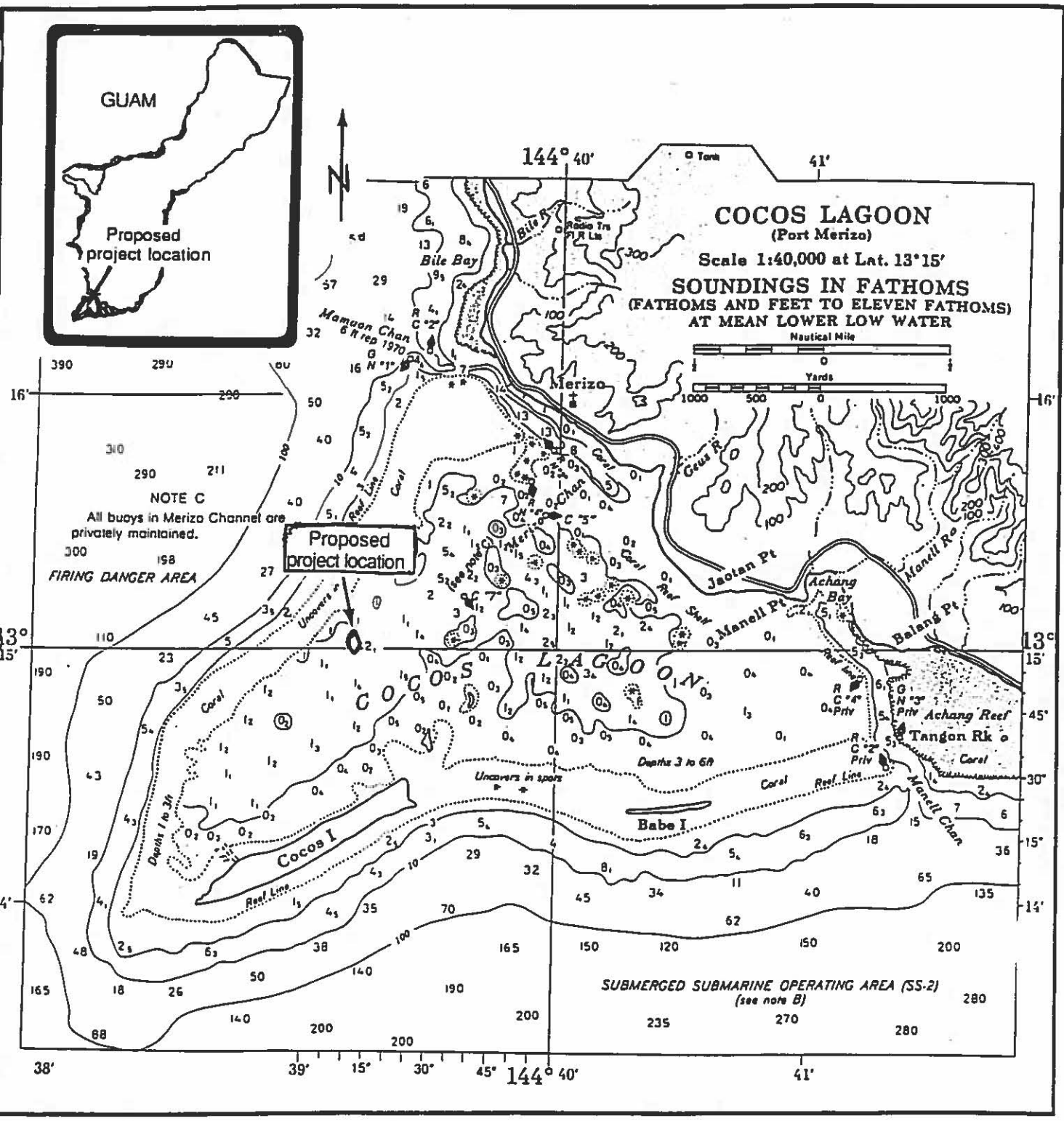

Figure 1. Vicinity map showing location of proposed project.

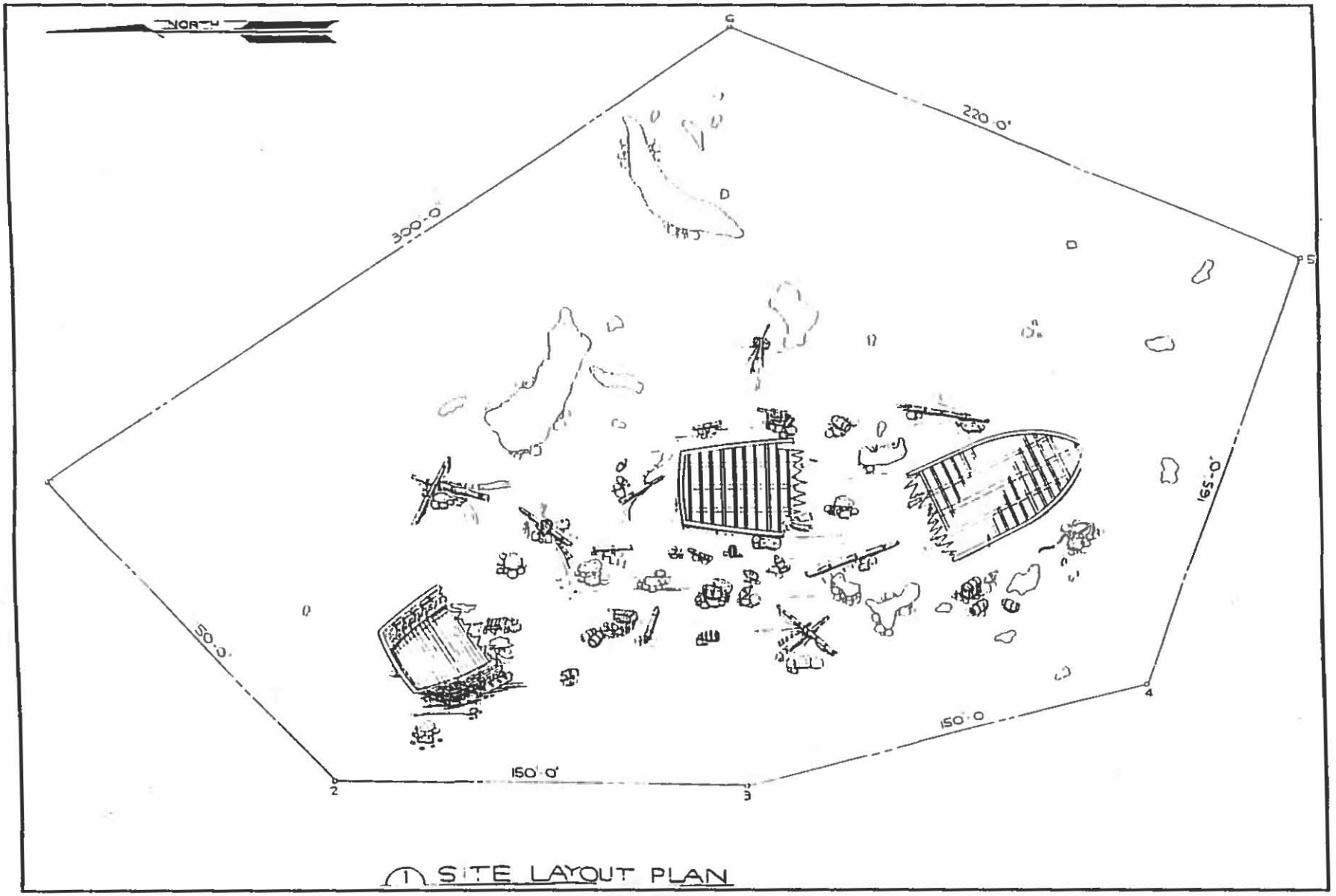

Figure 2. Placement of the replica galleon within the project site in Cocos Lagoon.

2. Purpose and Justification

Guam has undergone unprecedented development during the last seven to ten years. Most of this development has focused on hotel and condominium construction, primarily for the tourist sector. Only in the last few years has recreational development taken place, and the greatest growth in this sector has been in golf courses. Other relatively new attractions include the Atlantis tourist submarine and proposals for an underwater observatory. Few proposals, and only one existing attraction (the Talafofo River Tour), highlight unique environmental as well as cultural/historical aspects of Guam. This ecological sector of the tourism market, often referred to as eco-tourism, is an important sector for Guam's tourism industry to develop if it is to attract repeat tourists and diversify its tourism base.

The replica galleon shipwreck project represents an eco-tourism development opportunity that would be unique to Guam. It is envisioned that a tour package would consist of a briefing of the history of the actual wreck and a snorkeling or diving tour of the replica wrecksite (supervised by experienced guides). This could be coordinated with marine archaeological training at the site so tourists could view students at work. Glass-bottom boats would make the experience accessible to people who are unable to swim or snorkel. There is a large audience within the general public who have some exposure to marine archaeology through TV documentaries, books, and magazines. The replica galleon will tap that interest and give those people, both tourists and residents, the opportunity for an experience that they would find difficult to match anywhere in the world.

The creation of the replica galleon wrecksite will be the first step in establishing a marine archaeological program. A tentative agreement for such a program has already been reached between Antiquaria Guam, the Government of Guam and the University of Guam (UOG). The replica galleon wrecksite would be central to this program and would be used as a place where students could learn and practice underwater archaeological skills under safe conditions. As originally envisioned, the replica galleon would be used specifically for educational purposes. As the plan has evolved, it has broadened to encompass a larger spectrum of interests. This includes educational opportunities (in addition to UOG archaeology classes), local business development (in the form of owner operated boat operations and land based businesses) and the opportunity for local residents and tourists to view a

unique underwater attraction. To promote the educational aspects of the project, local school groups and residents (with advanced reservations) will be admitted free of charge.

3. Project Location

The replica galleon will be sunk in Cocos Lagoon (Figure 1). The vicinity of the proposed wrecksite is sandy with scattered large rocky mounds and has a depth from 14 to 20 feet during high tide. The proposed site is located outside of the navigational lanes used in Cocos Lagoon. The area of the wrecksite will be approximately 1.5 acres (6,130 square meters). No part of the replica galleon will rise more than ten feet off the bottom of Cocos Lagoon, and the replica will be at least six feet underwater at all times.

4. Project Design

The replica galleon will be designed to simulate how a 17th century wreck would appear after 50 to 100 years underwater. Figure 2 depicts the proposed layout of the major features of the replica shipwreck site. Hull timbers will be aged and will include parts of the ribs, beams, planks and keel. In addition, a replica of large portion of the sterncastle will be included. The site will incorporate a significant amount of genuine artifacts from the Pilar wreck, including chests of coins, ballast stones, nails, spikes, musket balls, Spanish helmets, pottery, ship fittings, and possibly cannons. In addition, replica cannons, anchors and other objects will be included. The artifacts will be placed accurately among the wreckage to replicate their logical location in an actual shipwreck. With the quantity and quality of the genuine artifacts that will be included, the project site will in effect be an underwater museum. For security reasons, more valuable artifacts may be removed at the end of each day and put back before opening. The replica and associated artifacts will be spread along the seabed in a manner conducive to establishing an underwater trail, with placards describing points of interest along the trail.

The design of the wreck will incorporate, as much as possible, concepts of artificial reefs to enhance the wreck's attraction to fish. In time, much of the replica will be covered with marine organisms as is typical of true wrecks in shallow sunlit waters. These organisms will likely include hard and soft corals, sponges, algae, anemones and other marine life. Viewing the marine life will become part of the wrecksite tour experience.

The project will include a pontoon-style boat that will be anchored at the project site. This boat will, in general, stay at the project site

and will provide a convenient area that will be used for a slide show and for orientation lectures. The boat will also provide limited refreshments and restroom facilities (i.e., U.S. Coast Guard approved Marine Sanitation Device (MSD). It is envisioned that visitors will stop at the pontoon-style boat for the slide show and orientation lecture and to pick up a guide. Visitors will then use their own boats to "gear-up" and enter the water.

The pontoon-style boat will remain at the site at night to provide security. The boat is envisioned to be roughly 50 to 60 feet long, 25 to 30 feet wide and 15 feet high. The boat will have a generator onboard which will be used to power the slide projector and lights. It will have permanent engines and will be easily capable of relocating during storm conditions. The boat will have lights, a radio and other Coast Guard required safety features. The boat will be anchored to the sandy areas of the bottom using a two to four point anchoring system.

Marker buoys will be placed at the boundaries of the project area. During the daytime, a buoyline will be connected between the marker buoys to clearly designate the swimming area and protect snorkelers and divers from motorized crafts. At night the buoylines and the marker buoys will be pulled down to a submerged position to avoid any potential navigational interference.

5. Construction Activities

The replica galleon will be fabricated from a combination of concrete and wooden timbers. Each hull section will be supported and anchored by three concrete support beams, which will provide strength and stability. Wooden timber ribs will be bolted to the support beam. Various wooden beams and plank will then be attached to the ribs and support beams. No preservatives or other anti-fouling chemicals will be added to the fabricated wooden timbers, as it is the intent of the developer to promote marine growth on the structures.

Fabrication of the concrete support beams will most likely be done on Guam, as will the fabrication of the pontoon-style boat. Fabrication of the ribs, beams, planks and other wooden structures will probably be done off-island, most likely in the Philippines, and shipped to Guam in pieces (in containers). The staging area for construction and assembly will be located in the Merizo area. In general, the assembly of the main shipwreck sections will be done at the project site, underwater. The main concrete support beams will be

floated out and lowered into place on the sand bottom. The timber ribs will then be bolted to the support beams, followed by the assembly of the other wooden parts. The lowering of the all parts into position will be controlled by divers wearing communication devices linked to the surface in order to avoid misplacement and potential damage. The majority of the assembly will be done on site so as not to have too large and bulky structures to transport from shore and sink in place.

Construction will begin as soon as possible after all the necessary permits and approvals are received. On-site construction and assembly is expected to take approximately six months to complete.

B. REQUIRED PERMITS AND SUPPORTING DOCUMENTS

1. Army Corps of Engineers Permit

The U.S. Army Corps of Engineers (USACOE) is responsible for, among other things, protecting the nation's navigable waters from obstructions and for maintaining the environmental quality of water resources. In accordance with Section 10 of the Rivers and Harbors Act of 1899, a Corps permit is required to perform work in or affecting navigable waters of the United States. The ACOE permit review process includes reviews by interested local agencies and organizations and may involve a public hearing. The ACOE will not issue a permit until all applicable Territorial regulations have been satisfied.

2. Seashore Reserve Permit

The Guam Territorial Seashore Protection Act, §§13410-13420, was originally passed in 1974, and amended in 1975, 1976 and 1978. Under §13417 of this Act, any person wishing to perform any development within the Seashore Reserve must obtain a permit from the Guam Territorial Seashore Protection Commission (TSPC) composed of the Territorial Land Use Commission (TLUC) members. No permit may be issued unless the TSPC first finds that the proposed development will not have any substantial adverse environmental or ecological impacts, and that it is consistent with the purpose and objectives of the Seashore Protection Act. This permit is necessary for construction of the proposed project as it is located within the Territorial Seashore Reserve.

3. Federal Consistency Review

All proposed projects which require a federal government license or permit must be approved by the Guam Coastal Management

Program (GCMP) Policies under Executive Order 78-37, the land-use standards established under Executive Order 78-23 and the Zoning Law. The development must be approved by GCMP for consistency with 16 policies adopted by the Government of Guam (GOG) regarding land use, protection and development of the Territory's land and water resources. The applicant has the burden of proof on all issues.

4. Submerged Land Lease

Antiquaria Guam will also apply for a submerged land lease from the Department of Land Management (DLM). Several government agencies will review and comment on the lease application which will go to the Attorney General, Governor and Legislature for final approval. The submerged land lease is necessary for the developer to charge tourists using the site. The lease is also necessary to allow the developer to protect and maintain the site and provide security for the genuine artifacts.

5. Building Permit

A building permit will be required from the Building Permits and Inspection Division within the Department of Public Works (DPW). Upon submittal of an application, DPW will identify those agencies from which clearances must be obtained. These agencies may include any or all of the following :

- Guam Environmental Protection Agency
- Department of Parks and Recreation
- Bureau of Planning
- Department of Land Management
- Public Utility Agency of Guam
- Guam Power Authority
- Department of Agriculture (Aquatic and Wildlife Resources)
- Guam Fire Department
- Public Health and Social Services

6. Environmental Protection Plan

Prior to the final approval of a building permit for projects involving substantial alteration to the environment, an Environmental Protection Plan (EPP) must be prepared. This document is the responsibility of the contractor. The EPP is intended to describe elements of the project which may pose serious environmental consequences unless remedial measures are

implemented to mitigate such problems. Elements of the proposed project in Cocos Lagoon to be addressed in the EPP include the following:

1. Natural resources protection
2. Sediment control
3. Control and disposal of solid, chemical and sanitary wastes.

7. U.S. Coast Guard Approval

The U.S. Coast Guard is responsible for charting and patrolling the navigable waters of the United States and its territories. Once all permits for the project have been attained, the Coast Guard must be given the coordinates of the project site in order to designate and chart the area as non-navigable.

A letter of approval from the Coast Guard has already been received for private Aids to Navigation (ATON) for a mooring buoy to be installed at the site. Additional approval will be necessary in order to properly mark the boundaries of the project site.

8. 401 Water Quality Certification

A 401 Water Quality Certification for this project must be obtained from the Guam Environmental Protection Agency to ensure compliance with sections 301, 302, 303, 306 and 307 of the Clean Water Act. No federal license or permit will be granted until the 401 Water Quality Certification has been obtained or waived.

II. EXISTING ENVIRONMENT

A. PREVIOUS STUDIES

Cocos Lagoon was extensively surveyed in 1975 and again in 1982 (R. H. Randall et. al., 1975, and R. H. Randall et. al., 1982). In these surveys, hard corals, soft corals, fishes, algae, seagrasses, and macroinvertebrates were studied. In addition, extensive surveys were performed in order to describe currents, topography, geology and other physical parameters.

B. PHYSICAL DESCRIPTION

1. Topography

The proposed project is located in the deep lagoon area (deeper than 10 ft.) of Cocos Lagoon. Most of the area is covered with thick sand. Coral mounds and knolls are scattered irregularly over the floor of the lagoon in this area and are the only conspicuous features located in this mostly flat sandy area. The larger boulders are up to eight feet high; however, none within the project site are exposed during low tides. Rubble varied in size and were generally piled in shallow mounds surrounding the boulders. Some rubble areas were without boulders, and consisted of shallow piles of rubble surrounded by sand.

2. Geology

a. Physiographic Description

Cocos Lagoon was divided into six physiographic units in a report by Randall et al. (1975). These units are defined as the nearshore shelf, barrier reef, Mamaon Channel, shallow reef bar, Manell Channel and lagoon hollow (Figure 3).

Closest to land is the nearshore shelf which slopes gently from land to depths of approximately 5 ft. at its outer margin. At the eastern end of this shelf, extending to the channel of Achang Bay, the nearshore shelf separates the reef from the shore, creating an area 1 to 2 ft. deeper than a normal reef flat. A small mangrove swamp is located along the shore of a small cove in the middle of the lagoon shoreline where the Geus River empties.

The barrier reef is the outermost physiographic unit of Cocos Lagoon and averages about 300 yds. in width, except at the northern end where it is approximately 600 yds. wide. A low algal ridge forms the outer edge of the reef and at the southern tip is Cocos Island.

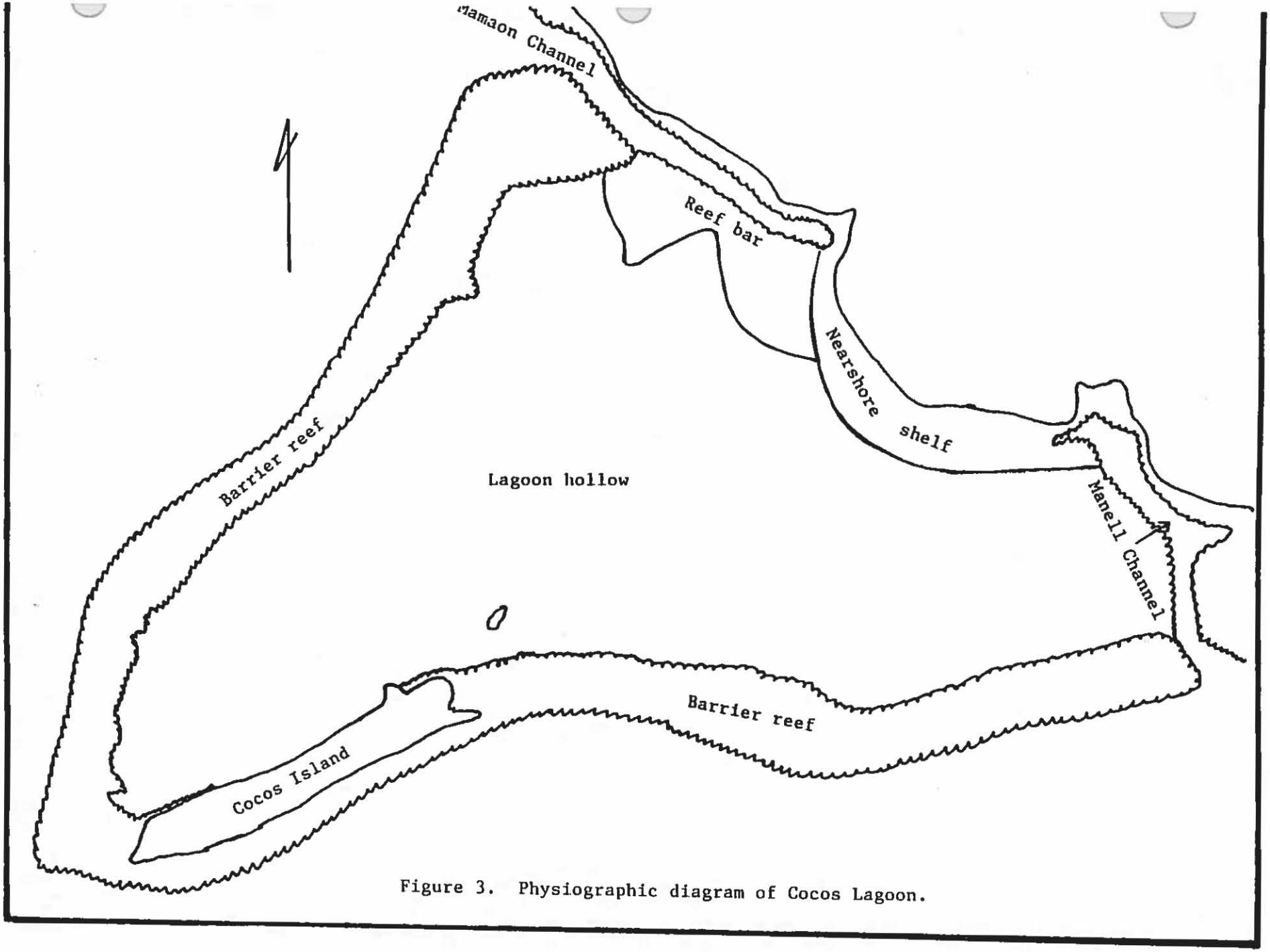

Figure 3. Physiographic diagram of Cocos Lagoon.

Mamaon Channel is a deep channel, approximately 100 ft. deep where is passes through the reef, located between the nearshore shelf and the north end of the barrier reef. The channel is approximately one mile long within the reef and 100 to 200 yds. wide and is at least 400 ft. deep about 1,100 yds. out from the reef. This channel may have been the original exit of fresh stream water from the lagoon.

Separating the nearshore shelf and channels from the main part of the lagoon is the shallow reef bar which is less than 10 ft. deep and consists primarily of branching and massive corals. This shallow reef bar may once have been a fringing reef which is now cut off from the open sea by the present barrier reef on which Cocos Island sits.

Separating the southeast part of Cocos Lagoon from the Achang reef flat platform is Manell Channel, which is greater than 100 ft. in depth. The head of this channel is at the mouth of the Tochog Creek and the Manell River. The channel extends in a seaward direction well beyond the reef margin edge.

The deep lagoon hollow is a gently undulating surface generally less than 10 ft. deep. However, against the reef bar in the northern part of the lagoon, this area is deep and irregular, extending to depths of 43 ft. The proposed project site is located in this deep lagoon hollow in depths of 14 to 20 ft.

b. Substrate Description

Most of the lagoon hollow is composed of broad expanses of sand with several rocky outcroppings. Sediment samples were taken at two stations (B and C, Figure 4) within the project site on December 18, 1991 and were analyzed by Geo-Engineering Inc. to determine grain size. The results of this study indicate that at least 60 percent of the substrate in this area is composed of fine sand. No gravel or coarse sand was present in the substrate sampled and 23 percent of the substrate was the maximum percent of very fine sand for the two stations.

The rocky outcroppings were composed of shallow rubble mounds, some of which also included large boulders up to eight feet high. Some of the rubble was formed by the calcium carbonate spicules of soft corals which are located within the project site. Other rubble, as well as the boulders, are of coral/algal origin.

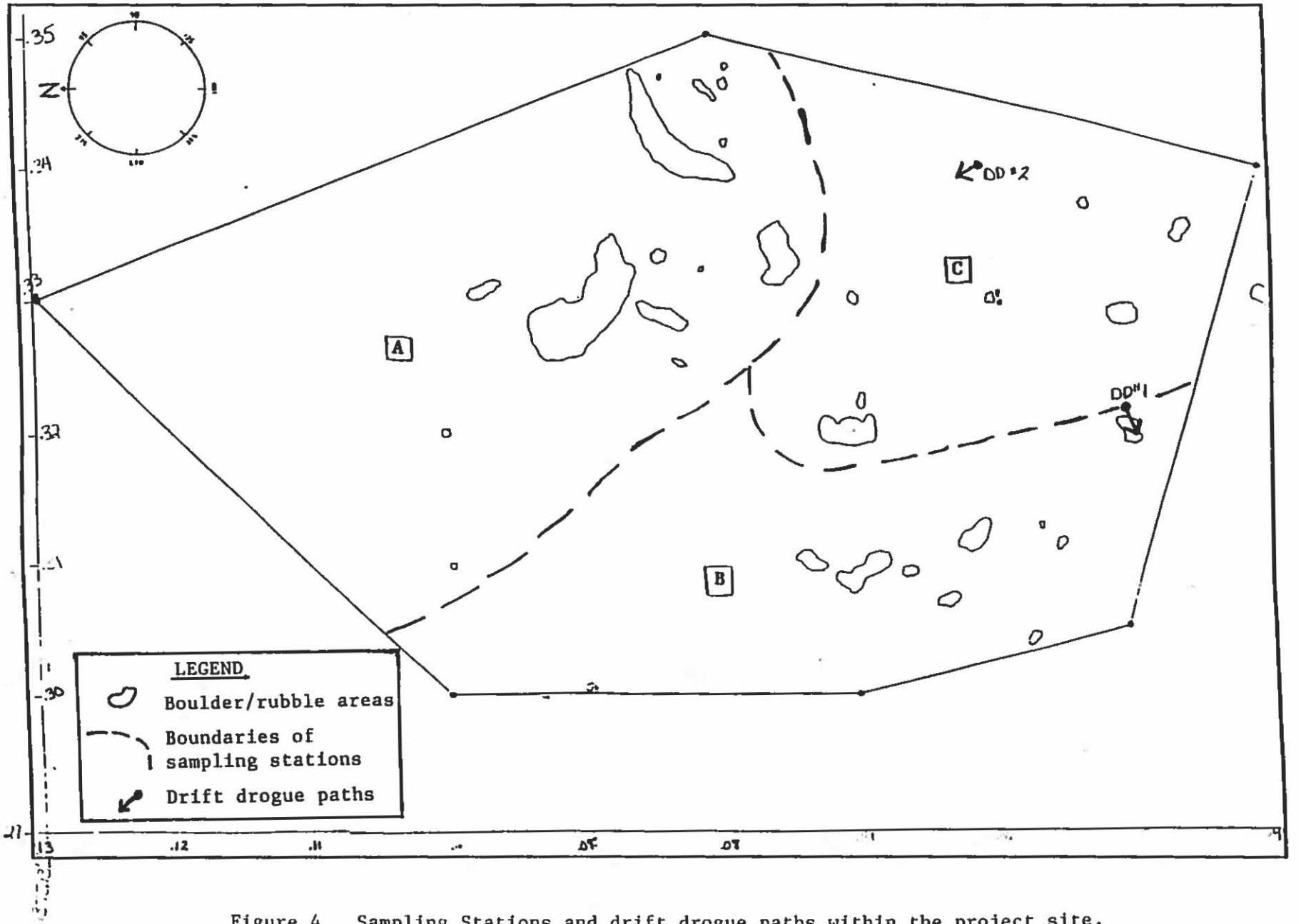

Figure 4. Sampling Stations and drift drogue paths within the project site.

(Refer to Figure 1 for location within Cocos Lagoon)

3. Water Circulation

a. Tides

The tides in Guam are semi-diurnal with pronounced diurnal inequalities. Tidal data from the U.S. Department of Commerce, National Ocean Survey, show that the mean tide range is 1.6 ft. and the spring tide range is 2.3 ft. The nearest tide gauge to the project site is at Apra Harbor, Guam, and these data are considered applicable to the proposed project site. Tidal data for a 19-year period (1949-1967) at Apra Harbor are as follows:

Tide	Feet
Highest tide (observed)	3.31
Mean Higher High Water (MHHW)	2.40
Mean High Water	2.30
Mean Tide Level	1.45
Mean Sea Level	1.41
Mean Low Water	0.60
Mean Lower Low Water (MLLW)	0.00
Lowest tide (observed)	- 1.89

Extreme annual predicted tide range on Guam is 3.5 ft. (from 2.6 ft. to -0.9 ft.), which occurs during June and December.

b. Waves

Deep water data (sea and swell) for the Guam area are available in the publication "Summary of Synoptic Meteorological Observations" (SSMO) prepared by the U.S. Naval Weather Service Command. Guam's wave climate is dominated by short period windwaves generated by trade winds from the northeast through southeast. The height of the short period wind waves is seven feet or less, 84 percent of the time. Longer period waves influencing Guam's wave climate are generated by storm centers (tropical storms and typhoons as distant as 1,000 miles). Wave heights of greater than 8 ft. can be expected to approach from the west through north sector 11 percent of the time during an average year.

Cocos Lagoon is generally protected from large waves by the reefs surrounding the lagoon and waves within the lagoon are generally wind driven.

It should be noted that during Supertyphoon Yuri, small buoys which were used to mark the boundaries of the project site were tied to small concrete blocks on the bottom of the lagoon. Following the typhoon, all of blocks and attached marker buoys were recovered at their original location. This suggests that even during a typhoon which generated winds in excess of 100 knots, water movement at the bottom of the lagoon will likely not be great enough to cause significant damage to the proposed project.

c. Currents

Generalized patterns of circulation obtained from a 1975 study (Randall et. al., 1975) show a predominant seaward flow at Mamaon Channel (Appendix B). A second current system was recorded in which there was a net mass transport of water over the barrier reef flat platform into Cocos Lagoon (Appendix B). The lagoonward flowing current in the deep channels depends upon the mass volume transport over the barrier reefs, which may result in a unidirectional seaward flow of water when mass volume transport is high and a lagoonward flow during flood tide conditions at times of minimal transport. Current studies done in 1982 (Randall et. al., 1982) also reveal that water drainage is toward Mamaon Channel in the west and much of the water entering Cocos Lagoon comes from across the barrier reefs, especially during moderate to heavy surf conditions (Appendix B).

A wide shallow reef flat somewhat isolates Manell Channel from Cocos Lagoon. In 1975, a seaward flowing current was often noted at the mouth of the channel, while at the head of the channel in Achang Bay, a lagoonward flow of water was present.

Currents studied in Cocos Lagoon in 1982 generally indicated a surface flow only. In some instances, the researchers had the impression that although moving in the same direction, the wind-driven surface flow was moving faster than the underlying water mass. Current paths recorded are included in Appendix B. Current speeds were generally slower than 0.25 m/s during most tidal and surf conditions. At Stations C,D and E current speed was not usually greater than 0.15 m/s. Current speeds in excess of 0.25 m/s were occasionally recorded during spring tides and heavy surf conditions.

Although an in-depth current study was beyond the scope of this project, current velocities at the project site in Cocos Lagoon were measured on December 18, 1991. Surface current velocities were determined by releasing drift drogues into the water at two stations within the project site

(Figure 4). A Global Positioning Satellite (GPS) was used to determine the latitude and longitude of the release point and recovery point of the drogues. This information was then used to determine the direction of current movement. The distance the drift drogues travelled was also calculated using the GPS. These results indicate that surface current movement in the project area is very slow.

Subsurface currents were also studied on December 18, 1991. Dye was injected into the water at a depth of 14 ft. to determine subsurface current velocities. The dye rose approximately three feet, then remained stationary, revealing little or no subsurface current movement. However, it should be noted that divers surveying the project area on other dates report that a weak subsurface current is noticeable.

4. Water Quality

Water quality in the area is classified by the Guam Environmental Protection Agency as M-1, Excellent. Water samples were taken on December 18, 1991 at two stations within the project site (Stations B and C in Figure 4) and were tested for turbidity (NTU). The results of this study indicate that turbidity within the project site is low. Turbidity at Station B was 0.06 NTU and 0.08 NTU at Station C.

C. BIOLOGICAL DESCRIPTION

Two distinct habitats exist in the project site and vicinity. Most of the area is covered with thick sand (at least one foot deep), with a few scattered small and large cone-shaped sand mounds built by unidentified burrowing worms (Photo 1 in Appendix C). These worms continuously turnover the sediment, exposing deeper layers to the upper surface conditions. Greater than 90 percent of the site consists of large expanses of this sandy habitat. Scattered irregularly in the sandy areas are small pieces of rubble (each less than four inches in diameter). The only conspicuous living organisms in the sandy habitat include algae (most of which has been washed in from surrounding areas) and sea cucumbers. Inconspicuous inhabitants include the burrowing worms, and other burrowing organisms such as crustaceans, bivalves and possibly fish.

Scattered irregularly throughout the area are mounds and knolls (Photo 2 in Appendix C). These are the only conspicuous physiographic features in the deep lagoon and provide a very different and distinct habitat

from that of the surrounding sandy floor. Some of these habitats consist of large boulders up to eight feet high surrounded by rubble, often covering areas greater than twenty feet in length (Photo 3 in Appendix C). Others have no large boulders, but consist primarily of rubble substrate. The rubble is derived from dead hard and soft corals and calcareous algae which originally built the larger boulders and smaller rubble. It is in these boulder/rubble habitats that the majority of living organisms are found including fish, corals, algae and invertebrates.

The boulder/rubble habitats are surrounded by large quantities of dark detritus. Much of this detritus is of terrestrial origin and was likely washed into the lagoon during Supertyphoon Yuri (November 27, 1991).

Field surveys were conducted during the day on December 18, and at night on December 21, 1991. Three daytime dives were performed at three stations, Station A, Station B and Station C (Figure 4). One night dive surveyed the general project site, with emphasis on fish, and invertebrates.

1. Marine Flora

Marine algae were surveyed during three daytime dives at the project site. All species observed were noted on underwater paper and appear in Table 1 (Appendix A).

A total of 11 species were observed at the three wrecksite stations (Stations A, B, and C). Sporolithon, a crustose red algae that forms small red-green knobs, was the most abundant species. Turbinaria ornata, a brown algae, although abundant, was only occasionally attached to the substrate. Most of this species was lying unattached on the sand and was most likely washed in from surrounding areas. Common species included Dictyota bartayresii, Porolithon onkodes, Sargassum cristaefolium and an algal scum that covered most hard surfaces.

Most algae at the project site grows on the boulder/rubble substrate. The only algae growing in the sandy areas were Dictyota, Halimeda, Padina, Turbinaria and Sargassum, and most of these were lying unattached to the substrate. These same species, when growing in the boulder/rubble areas, were attached.

2. Marine Fauna

a. Corals

Previous Surveys

Hard and soft corals, fish, algae, seagrasses and macroinvertebrates were surveyed during theses studies along 24 transects in the lagoon, and different biotopes based on the results and physiographic conditions were recognized. The proposed location for the wrecksite corresponds with the outer margin of Biotope IC (Lagoon floor deeper than 10 feet) where it begins to grade into Biotope IB (Shallow lagoon floor). The boulder/rubble areas as identified in this report correspond to Biotope ID (Patch reefs).

Corals were, for the most part, restricted to the boulder/rubble areas (the reports called them knolls, coral mounds or patch reefs in increasing size). No patch reefs occur at the proposed wrecksite. Knolls (diameter equal to or less than their height) often were a single large colony of Porites with smaller corals growing around its base. Many were dead, though columnar or ramose forms of Porites were likely to be living. Mounds (diameters greater than their height) were surrounded by irregular sized rubble and small boulders which were substrate for coral growth. Percent coral cover on surveyed mounds ranged from 33 to 45 percent.

The most significant change in the 1982 survey was that coral cover had increased in all biotopes from the 1975 survey. This was attributed to the resurgence of corals following the Acanthaster outbreak of the late 1960's and early 1970's.

A survey was conducted by PBEC in early 1991 on coral mounds in the northeast deep lagoon floor, corresponding to Biotopes IB and IC (PBEC, 1991). Although no quantitative studies were conducted, the percent coral cover on the surveyed mounds was extremely low, less than one percent.

Current Survey

Hard corals were surveyed during three daytime dives at the project site. All species observed were noted on underwater paper and appear in Table 2 (Appendix A). Soft coral species are compiled in Table 3 (Appendix A) with other invertebrates.

A total of eleven coral species were observed at the three wrecksite stations, and all but one of them formed small encrusting colonies. The most abundant species was Leptastrea purpurea, which grew in small

encrustations, usually one inch in diameter. Astreopora myriopthalma and Stylocoeniella armata were also relatively common, and also grew in small, one inch diameter encrustations. Only one coral was not an encrusting species, Pocillopora damicornis, and only a single two inch high colony was observed.

Although no quantitative studies were conducted to assess percent coral cover in the boulder/rubble habitats, it is likely that corals covered less than one percent. This is in contrast to the averages observed in 1975 (33 to 45 percent). It is, however, similar to coral cover observed on the mounds surveyed in early 1991 by PBEC personnel (PBEC, 1991).

No corals were growing in the sandy areas; however, small coral encrustations were observed on all the boulders and most of the larger rubble at the three stations. Few corals were larger than two inches in diameter. This indicates either that there was a large die-off a few years ago, or there is a chronic mortality caused by some unknown factor (possibly Acanthaster planci predation) which keeps the corals from growing into large colonies.

b. Macroinvertebrates

Macroinvertebrates were surveyed during three day and one night dive at the project site. All species observed were noted on underwater paper and appear in Tables 3 and 4 (Appendix A).

Echinoderms - A total of 20 echinoderm species (Table 3) were observed at the project site. Of these, 13 species were sea cucumbers. The most abundant species were Holothuria atra and H. edulis. Holothuria axiologa and Bohadschia marmorata were observed in the sandy areas only, the rest of the species were observed in both sandy and boulder/rubble areas. Sea cucumbers were the only conspicuous species in the sandy areas.

A single Acanthaster planci, a large starfish that feeds on corals, was observed on a reconnaissance snorkel one week prior to the December 18 survey. It was visible on top of a large piece of rubble, most likely feeding on a patch of coral. During the field survey, no A. planci were observed, however, bleached corals, evidence of their presence, were observed at each of the stations.

Miscellaneous macroinvertebrates - Other macro-invertebrates observed in the boulder/rubble areas were anemones, zoanthids, Sinularea polydactyla (a soft coral) (Photo 4 in Appendix C), ascidians, sponges, nudibranchs, tridacna, featherduster worms and large benthic

foraminifera (Table 4). Most common were Sinularea and orange sponges. Zoanthids formed locally abundant colonies covering up to three square feet in diameter at Station A and B. Tridacna, a giant clam, were common at all stations and were generally smaller than eight inches in diameter.

Several species of mollusks and crustaceans were observed only during the night survey. These species are also listed in Table 4 (Appendix A).

c. Fish

A fish survey was conducted during three day and one night dive. All fish species and abundances were noted during 15 minute timed counts at each of four stations (two counts were conducted in area A). The surveys were conducted by swimming slowly, looking under rocks and in holes. The surveys concentrated around the boulder/rubble areas, but the sandy habitat was also surveyed. The nocturnal survey was conducted to pick up cryptic species and those that feed at night. A list of species is compiled in Table 5 in Appendix A.

A total of 59 species were observed at the project wrecksite. The majority of the fish observed occurred in and around the limestone rocks and soft coral colonies. The most abundant species observed were the damselfish Pomacentrus pavo and Chromis viridis. Commonly observed species include the damselfish Dascyllus aruanus, the wrasse Halichoeres trimaculatus, the cardinalfish Apogon cyanosoma and the dartfish Ptereleotris microlepis.

Fish observed in the sandy areas include the emperor Lethrinus harak, goatfish Parupeneus barberinus and P. multifasciatus, the puffer Arothron manilensis and the goby Valenciennea strigatus.

Fish fauna observed during the night survey was less diverse and numerous than what was seen during the day. Fish species that were only observed at night include the moray eel Gymnothorax reupelliae, the stingray Dasyatus kuhlii and the grouper Epinephelus hexagonatus.

3. Endangered Species

Two endangered species are known to visit the vicinity of the project site. Chelonia mydas, the green sea turtle, is frequently seen swimming in the lagoon and in the project site, and has been known to nest on Cocos Island. The endangered hawksbill turtle, Eretmochelys imbricata, is also known to visit the lagoon. In addition, there were sightings of the endangered sea cow,

Dugong dugong, in 1974. It was seen surfacing for air and feeding on seagrasses in the lagoon. No recent sightings of the Dugong have been recorded.

C. LAGOON USE

The lagoon is popular among both island residents and tourists for year-round recreational activities such as swimming, snorkeling, SCUBA diving, jet-skiing, windsurfing, para-sailing, waterskiing and sailing. In the past Cocos Lagoon has hosted the Cocos Cup, an annual international windsurfing competition. In addition, the Merizo Water Festival is an annual event featuring competition in swimming, snorkeling, jet-skiing, windsurfing and canoeing, as well as exhibition waterskiing. Sailing is also a popular activity during the festival.

In addition, the lagoon experiences a considerable amount of traffic by boaters accessing the Philippine Sea through Mamaon Channel. Many fishermen commonly access the waters around southern Guam by way of Cocos Lagoon. The lagoon itself is also a popular fishing area used by line, net and spearfishermen for subsistence fishing.

III. ALTERNATIVES TO PROPOSED PROJECT

A. SITE SELECTION

1. Criteria

Several criteria were established for use in evaluating potential sites for the proposed project. Since the developer wanted the replica site to be in close proximity to the actual wreck site of the Pilar, it was decided that a location within the protected waters of Cocos Lagoon was preferred. This would also allow the project to be incorporated into existing Cocos Island tourist activities, instead of developing an entirely separate location and establishing a client base.

Within the lagoon, several site selection criteria were established. These criteria included the following:

1. An area without substantial coral growth or seagrass beds where impacts would be minimal.
2. Safe from large waves and strong currents.
3. Adequate visibility.
4. Bottom type primarily sand or rubble and not easily stirred-up silt or fine sediments.
5. Adequate depth.
6. Away from traditional or preferred fishing areas.
7. Outside of regular or established boat channels or boat traffic areas.

2. Preferred Site

The preferred site was selected for its location, water depth, lack of benthic marine resources and for the minimal impact the proposed project would have on the environment and other users of Cocos Lagoon. The preferred site is also a short boat ride from Cocos Island and the Merizo Pier and is well outside vessel traffic lanes.

The preferred site has an abundance of mostly barren sand bottom where the replica wreck can be situated without impacting corals or seagrasses. The limestone mounds provide some corals and most of the fish population that will hopefully recruit to the wreck in time. The 14 to 20 foot depth also provides sufficient water depth to install the replica shipwreck and have at least six feet of clearance above the top of any submerged object.

Finally, the site is also not normally frequented by divers, fishermen, windsurfers or jetskiers and is not used for other recreational activities.

3. Alternative Sites

A total of three (3) sites were investigated after eliminating many areas of the lagoon due to shallow depth, boat traffic and dense seagrass beds. Locations of the alternative sites are shown in Figure 5. The following are brief descriptions and reasons for rejection of the two sites that were not selected.

Alternative Site 1

The first site that was investigated is located northwest of the preferred site in a mostly sandy area close to the outer reef flat coral zone. Depth here varies from 5-25 feet with some moderate slopes. The bottom is comprised of a fine silty layer on top of a sand layer. The upper fine silty layer was easily stirred up by divers causing poor visibility. The area also had scattered staghorn coral (Acropora) and various species of invertebrates and marine plants. Fish diversity and abundance was not great at the times this area was surveyed.

Site 1 was rejected primarily because of the potential siltation and visibility problem. It was felt that reduced visibility from waves, currents and/or divers would cause difficulties for the glass bottom boats, snorkelers and divers, particularly in areas deeper than 10-15 feet.

Alternative Site 2

The second site that was surveyed is located in the southwest portion of the lagoon in close proximity to the barrier reef and the narrow channel that cuts through the reef. Depth at this location varied from 9-12 feet. Fish life was more abundant here, possibly due to the proximity to the reef and channel. The bottom is primarily sand and rubble with some limestone and corals.

Upon further investigation, it was discovered that this area is occasionally used by local fishermen. The channel, which is actually a narrow, naturally occurring cut through the reef, is also used by fishermen and small boats to get outside the lagoon. Therefore, it is likely that situating the project at site 2 would impact local fishermen as well as be too close to an area of boat traffic. These factors, combined with the borderline water depth, resulted in rejection of this location.

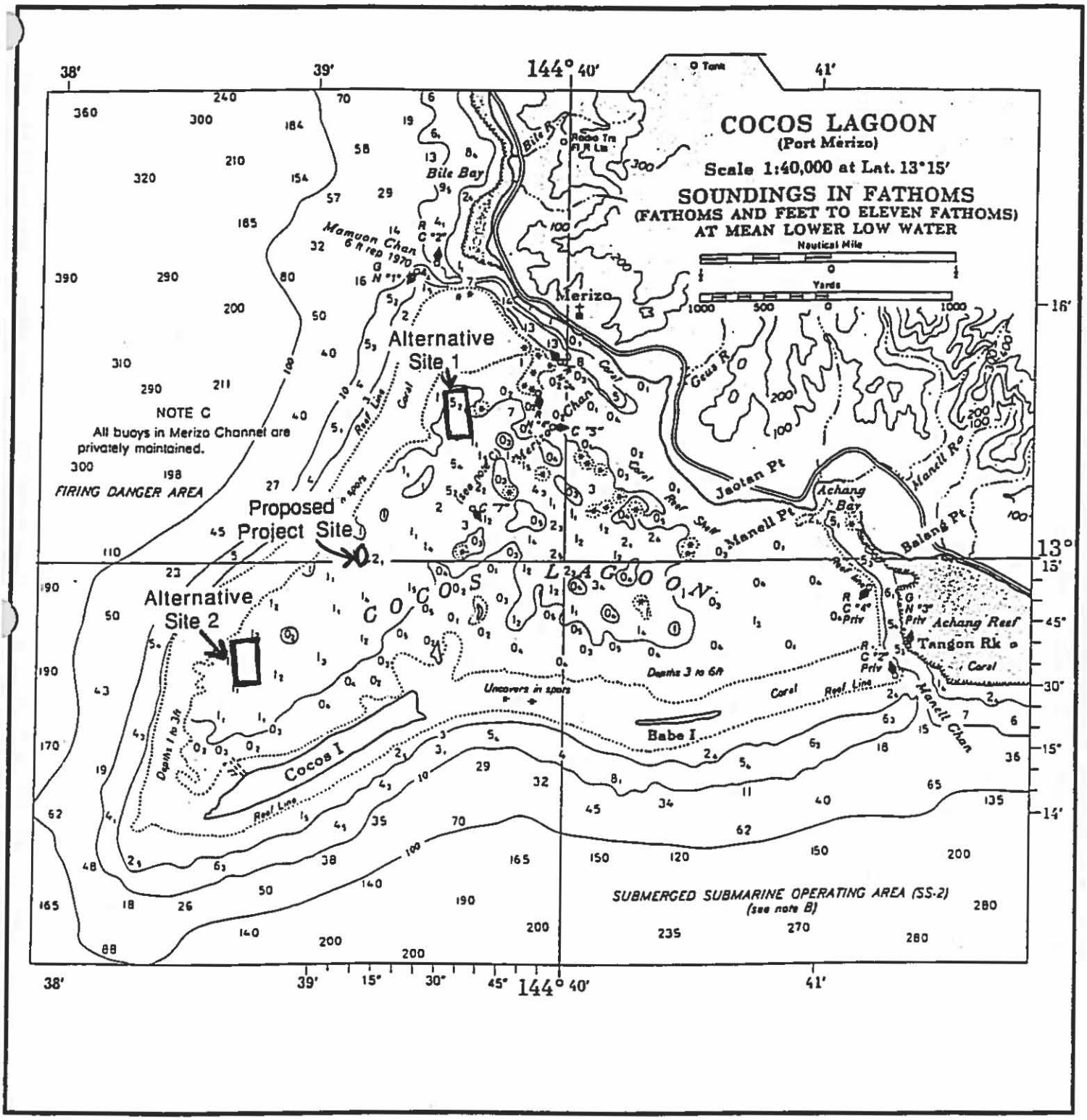

Figure 5. Alternative site locations within Cocos Lagoon.

B. PLAN MODIFICATIONS

The initial thoughts for the project were to construct a replica of the wrecked galleon and place it within the protected waters of Cocos Lagoon specifically for educational purposes - providing a place where marine archaeology students could learn and practice their skills under safe conditions. It was evident during the project's early planning stages that educational and general interest in the shipwreck were widespread. It was then decided to revise the plan to its present concept which encompasses a much broader spectrum of interests.

The present concept is the preferred alternative because it utilizes this unique historical asset for broader educational and recreational opportunities and also provides more potential for local business development. The broader uses of the replica wrecksite will create a greater awareness of Guam's past and an appreciation for Guam's natural environment.

C. NO ACTION

The alternative of no action would result in the project not being built. The historical tie between the Pilar and the people of Guam would not be realized to the extent it would be if a replica of the Pilar was placed in Cocos Lagoon.

If the proposed project were not built, the employment, income and tax revenues to the Government of Guam would not be realized. Support and spin-off businesses such as boat services, diving tours, glass bottom boat tours and others would not occur. Much of the potential benefits of employment and income would likely come to residents of Merizo and other villages in southern Guam if the project were built in Cocos Lagoon.

No action would also result in the loss of a potential site for teaching underwater archaeology courses through the University of Guam. No such site now exists and work in the area of the Pilar site is next to impossible and very dangerous for teaching/training purposes due to heavy wave assault and strong currents.

IV. SIGNIFICANT CRITERIA

Significant environmental standards and criteria which must be maintained throughout the development process are outlined in the following sections. These standards and criteria encourage environmental planning to begin in the earliest stages of project conceptualization. They also help to promote and develop policies, plans, activities and projects that achieve complementary and mutual support between natural and man-made as well as present and future components of the physical, natural and cultural environment.

A. STATUTORY CRITERIA

The guiding document for environmental statutory criteria is the National Environmental Policy Act (NEPA) of 1970. In addition, standards set forth in Guam's existing statutes and regulations provide further criteria which must be met by developers to ensure environmentally sound development. The regulation of and standards for the quantity of silt and nutrients acceptable in waters in and around Guam serve as examples of criteria to which developers, contractors and others must adhere. These criteria are outlined below.

1. National Environmental Policy Act

Relevant goals and objectives of existing federal and local environmental laws reinforce the original intent of the National Environmental Policy Act (NEPA) of 1970, which was promulgated to ensure that all federal agencies consider environmental concerns in planning and decision-making activities under full public view. Over the past two decades the intent of NEPA has expanded broadly on Guam to encompass nearly all facets of development aimed at fostering the wisest use of natural resources available in an island environment.

2. Clean Air Act

The US Environmental Protection Agency (USEPA) established national ambient air quality standards in the Clean Air Act of 1977. This law provides environmental protection by setting pollution level standards or limiting emissions for various classes of pollutants. The Guam Air Pollution Control Standards and Regulations of 1987 authorized the formulation of air

quality standards and is enforced by the Guam Environmental Protection Agency (GEPA).

3. Guam Water Pollution Control Act

It is the public policy of the Government of Guam (GOG) to conserve, protect, maintain and improve the quality of the waters on and around the island. This policy maintains that no pollutant discharge into any water will be allowed unless it receives processing, or the discharge meets the effluent limitations established for discharge into that body of water. Also, the policy provides for prevention, abatement and control of new and existing water pollution. To assist in obtaining this goal, all discharges will be controlled (permitted) either through the National Pollutant Discharge Elimination System (NPDES) process or through GEPA's local permit program. Therefore, pursuant to the authority contained in the Guam Water Pollution Control Act, GEPA has adopted standards of water quality for Guam. The purpose of these Water Quality Standards is to prevent degradation of water resources resulting from sources of pollution. It is not the intent of these standards to restrict activities which may cause pollution, but to regulate such activities. An Environmental Protection Plan (EPP) must be prepared by all developers, contractors and others prior to construction to ensure that water resources will not be degraded. All EPPs must be submitted to GEPA for approval.

The design requirements for wastewater system infrastructure improvements must conform to the standards adopted by the Public Utility Agency of Guam (PUAG) and GEPA.

B. DERIVED CRITERIA

Technically derived measurements apply primarily to the engineering design of the development. The design of the project must conform to standards and specifications that have been established to ensure that the development is safe and the island is not impacted in ways that deprive residents of basic necessities. The criteria are established by various engineering societies and the GOG utility agencies. A few of the most widely used technical standards are listed below.

Uniform Building Code (UBC)
American Society of Testing and Materials (ASTM)
American Institute of Steel Construction (ASIC)
American Concrete Institute (ACI)

C. POLITICAL, SOCIAL AND CULTURAL CRITERIA

Public hearings conducted to obtain concerns and input from individuals affected by the proposed development will be held prior to the start of the project. The opportunity for testimony at public hearings serves as a criterion of significant input from affected groups and from the public-at-large. The review process conducted by the Territorial Land Use Commission (TLUC) also serve this purpose.

Review by the Development Review Committee (DRC) includes review by GOG agencies such as GEPA, the Department of Land Management (DLM), the Bureau of Planning (BOP), the Department of Agriculture and Wildlife (DWR), the Public Utility Agency of Guam (PUAG), the Department of Commerce (DOC), the Chamorro Language Commission (CLC), and the Department of Public Works (DPW). This review process serves as a criterion of significance via the political process.

V. DESCRIPTION, MAGNITUDE AND EVALUATION OF IMPACTS

This chapter is separated into two main sections. The first section defines and evaluates the impacts associated with the construction phase of the proposed project. The second section defines and evaluates the post-construction (or operating phase) impacts of the project. The chapter is separated into these sections because the impacts associated with the construction phase are, in many cases, very different than the post-construction impacts. In addition, most construction phase impacts are temporary, whereas the post-construction phase impacts are generally recurring or permanent.

A. CONSTRUCTION PHASE IMPACTS

1. Economic

The economic impacts of the project are best assessed in terms of fiscal impacts to the Government of Guam (GOG) and overall employment impacts. The fiscal impact to GOG can best be measured in terms of costs and revenues. Costs to GOG are those expenses incurred directly as a result of this project, such as infrastructure and utilities improvements. Revenues are the sources of income to GOG from the project, such as taxes and fees.

The total design and construction cost for the project has been roughly estimated at $700,000. Revenues to GOG will be in the form of permitting, filing and recording fees, gross receipts taxes via construction and professional services contracted out to local firms, and payroll taxes from the direct employment of construction workers. No estimate has been made of the revenues to GOG; however, given the small magnitude of the total construction cost, the revenues to GOG will not be significant.

The construction phase of this project will result in increased short-term resident employment and income as well as increased expenditure on Guam by non-resident construction workers. No estimate is available on how many construction workers will be required for this project.

Overall, the construction phase of this project will not have a significant fiscal or employment impact.

2. Infrastructure and Utilities

This project will not require any permanent utilities hook-ups and no infrastructure improvements. Temporary hook-ups to power and water to support the shore-based construction staging and assembly operations will most likely be required for the construction phase of the project. The power and water needs for the construction phase of the project have not been estimated; however, there will be minimal use of these utilities and the impact on the existing infrastructure will not be significant.

3. Pollution

During construction, operation of heavy equipment, barges and boats will create exhaust and emissions. These will be concentrated in a relatively small area and normal trade winds will carry the emissions out to sea. It is not anticipated that emissions from equipment will create a significant impact to the surrounding area.

4. Sedimentation During Installation

The structure will be placed on the sandy areas of the lagoon floor. Placement of the structure on the lagoon floor may result in some sediment being stirred up, and divers assisting with the placement of the wreck may also stir up sediments. Based on subsurface currents observed in the lagoon, the stirred-up sediment may rise slightly, but will likely settle to the bottom without travelling far from the project site.

5. Biological

The replica will be placed by divers on the lagoon floor around the mounds and knolls in the sandy areas to avoid damaging the marine environment. Marine flora and fauna that live on or below the substrate where the wreck is to be placed will be impacted during construction. Conspicuous organisms that live on the substrate directly below or in close proximity to the work area will be moved outside the work area. No corals or sponges will be impacted by the placement of the wreck on the lagoon floor. Divers working in the water during placement of the wreck will be careful to avoid stirring up sediments and damaging corals.

Because the site does not contain any seagrass beds, and the area can be easily avoided, it is not likely that the construction process will impact the endangered sea turtles. They will likely swim around the site while workers are in the area.

6. Navigational Hazards

Once all the permits for the proposed project have been attained, the U.S. Coast Guard will receive notification of the coordinates of the project site. This area will then be charted and designated as a non-navigable area. Private ATONs will be placed at the project site to properly mark the mooring buoy and the boundaries of the project site. The project site is located well outside established traffic lanes.

7. Recreational and Scenic

Cocos Lagoon is extensively used for several types of water recreation. As mentioned in Section II.D., the lagoon is used for swimming, snorkeling, SCUBA diving, waterskiing, jet-skiing, sailing, para-sailing and windsurfing. For safety purposes, during offshore construction water recreators will be restricted from areas directly under or near the construction zones. However, the project area is very small in comparison to the total size of Cocos Lagoon and restricting access to the construction areas will have no significant impact on recreators.

B. POST-CONSTRUCTION PHASE IMPACTS

1. Economic

In addition to the revenue generated during the construction phase, the proposed project will generate a moderate of recurring income to the GOG in the form of gross receipts taxes from the admission fees and payroll taxes. In addition, the project will create a number of direct and indirect business opportunities which will also generate income to GOG in the form of gross receipts and payroll taxes.

Preliminary staff requirement estimates for operating seven days a week and 350 days a year include two site managers, two divemasters, four site assistants, two museum shop managers, four shop assistants and a general maintenance person. The estimated 15 employees will total approximately $390,000 per year in payroll which will provide the associated income tax to GOG.

Revenues from sales of tours, admissions and museum shop items are projected by Parigon Consulting, Inc. to generate annual revenues to GOG of approximately $120,000 in gross receipt taxes (GRT) and approximately $380,000 in corporate taxes. An as yet undetermined amount of income from the submerged land lease will also be paid to GOG.

In addition to payroll expenses, other operating costs are estimated at approximately one million dollars per year. These costs include such things as insurance, rentals, fuel, vehicles, maintenance, advertising, legal and accounting services. Most of these expenses will be direct infusions of money into the local economy, generating additional tax revenues for the government. Indirect GRT are estimated to be about $20,000 annually.

The total recurring annual income to GOG is estimated to be approximately $520,000 (plus personal income taxes and submerged land lease payments). Projected increases in the number of admissions and sales revenues will result in an associated increase in GOG annual revenues from the project and spin-off businesses.

2. Infrastructure and Utilities

The pontoon-style boat to be utilized at the wrecksite will have a generator and restroom equipped with a U.S. Coast Guard approved MSD. Approximately once per week, or as necessary, the boat will motor to the Merizo area for refueling. All refueling and emptying of the sanitary-waste storage tanks will be done shoreside in Merizo. The operation of the replica wrecksite will not require any public utilities or infrastructure hook-ups; therefore, it will have no impact in these areas.

The majority of the visitors to the replica galleon wrecksite are expected to come from the Cocos Island resort, and the transportation and diving functions will be part of a larger Cocos Lagoon tour package. As such, the operation of the replica galleon wrecksite is not expected to significantly increase the number of visitors to the Cocos Lagoon area. Therefore, the impact on traffic and parking in the southern Guam area is not expected to be significant.

3. Pollution

A small generator will be used on the pontoon-style boat at the wrecksite to provide power, and will produce a small amount of air and noise pollution. All refueling will be done shoreside to eliminate any potential hazards which may result from on-site refueling.

4. Biological

Little or no habitat modification and loss will occur as a result of the proposed project. The materials used to fabricate the replica galleon will contain no toxic or hazardous materials. For example, the wooden parts will not contain preservatives or anti-fouling chemicals, as it is the intent of the

developer to promote marine life on and around the wrecksite as quickly as possible.

The replica shipwreck and associated artifacts will act like an artificial reef by supplying a hard substrate on which reef organisms can grow. Most attached reef organisms, including hard corals, many soft corals, sponges, most algae and others, require a hard surface on which to settle and grow. The surrounding areas are sandy and unsuitable for settlement by these types of organisms. Also, the addition of a diverse structure (as opposed to the relatively flat and featureless sandy surroundings) will give fish and other mobile creatures such as crustaceans, echinoderms and gastropods places to hide from larger predators. This will enhance the surrounding area for divers, snorkelers and even fishermen.

Most of the hard corals found within the project site are small encrusting corals attached to the mounds and knolls and are unlikely to be damaged by snorkelers or divers. A potential exists for damage to the soft coral colonies. However, all divers will be accompanied by guides who will ensure that these colonies are not damaged.

Because the site does not contain any seagrass beds, and the area can be easily avoided, it is not likely that the operation of the facility will impact the endangered sea turtles. They will likely swim around the site.

5. Navigational Hazards

As mentioned in Section V.A.6., the project site is outside regular navigational lanes and will be designated and charted as a non-navigable area. Private ATON's will be installed at the site for the mooring buoy and buoys designating the boundaries of the project site. The swimming area will be designated by using marker buoys and connecting buoyline. At night the buoylines will be removed and the marker buoys will be pulled down to a submerged position to avoid any potential navigational interference.

The pontoon-style boat which will be located at the site will be required to have proper navigational lights as defined by the U.S. Coast Guard.

6. Recreational and Scenic

Construction of the replica galleon will have a direct impact on recreational uses in Cocos Lagoon. The replica will enhance recreational activities in the lagoon by providing a unique attraction for snorkelers and SCUBA divers. The proposed project site only occupies a small portion of the lagoon, and should in no way affect the popular recreational activities that occur

in the lagoon. Markers buoys and connecting buoyline will be used to designate the swimming areas at the project site to protect snorkelers and divers from motorized craft.

The pontoon-style boat to be utilized at the project site will be the only structure visible from the surface. The proposed site for the project is approximately two miles off-shore from Merizo and in same general direction as Cocos Island. From this distance and with Cocos Island in the background, the boat (which will be no more than 15 feet high) should have no adverse visual impact and, in general, will not significantly alter the aesthetics of Cocos Lagoon. It is the intent of the developer to coordinate the design of the pontoon-style boat with local residents so as to minimize any potential adverse scenic impact.

As mentioned in the biological impacts section, the replica shipwreck site will likely provide a habitat for fish and other marine organisms and will enhance the surrounding are for divers, snorkelers and fishermen. It is the intent of the developer to coordinate with and develop an understanding of mutual respect with local fishermen who may become interested in fishing around the replica shipwreck.

7. Educational

Antiquaria Guam, the Government of Guam, and the University of Guam have a cooperative agreement to use the unique opportunity presented by the proposed project to help establish a marine archaeological program at the University. The replica could serve as a training ground for students and field assistants to learn practical working skills and gain diving experience in a safe, controlled location before being exposed to a genuine wrecksite. The wrecksite would also be suitable for biological studies such as patterns of fish and coral recruitment.

Antiquaria Guam may also offer to set up a program for Guam's schools. Schoolchildren on Guam will have the chance to get a realistic glimpse of the island's 17th century history. A wrecksite visit would also include an audio-visual presentation of the project. Educational opportunities exist for all of Guam's residents who will be able to rediscover a period of the island's historical past. Although reservations to visit the site will be required, all Guam residents will be allowed free admission to the replica galleon wrecksite.

C. CUMULATIVE IMPACTS

The cumulative impacts are those that result from the incremental impact of a proposed action when added to other past, present and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of years.

In the case of the proposed project, the unique nature of the project excludes the potential for similar development. As such, the potential for significant cumulative impacts from other similar development within Cocos Lagoon is remote.

There are potential cumulative impacts associated with the support and spin-off businesses associated with the proposed project. It is not the intention of the developer to establish a transportation business, boat cruises/tours or tourist-oriented SCUBA diving or snorkeling operations. It is envisioned that, to a large extent, this project will tap into the tourist market for the Cocos Island resort and that the transportation, diving, and the business opportunities will be fulfilled by other members of the local community. One impact of this project and support and spin-off businesses would be to provide opportunities that are suitable for residents of southern Guam. These opportunities would be ones which would not disrupt or unfavorably alter the village lifestyle. If local entrepreneurs do not take advantage of the opportunities, the developer will provide whatever transportation and ancillary services are necessary.

A potential impact is the increase in visitors to the Cocos Lagoon area and the associated increase in traffic and parking congestion. However, with the majority of the visitors to the project coming from the Cocos Island Resort tour and with the spin-off business opportunities being fulfilled by southern Guam residents, the cumulative impact on traffic, parking and the area's infrastructure should not be significant. In addition, the Cocos Island Resort development has already received permit approvals to construct paved parking lots in Merizo which will provide parking for a total of 27 buses and 88 cars.

VI. ENVIRONMENTAL PROTECTION AND MITIGATION MEASURES

The proposed project, as discussed in Chapter V, does not present any significant adverse environmental impacts. As such, the project does not require any specific environmental protection or impact mitigation measures. The project will require an environmental protection plan (EPP), and since the project site includes some corals and marine species' habitat, protection of these natural resources must be addressed. These subjects are discussed in this chapter.

A. ENVIRONMENTAL PROTECTION PLAN

An EPP will be prepared and submitted for approval to GEPA prior to any site work and issuance of the building permit. The EPP will describe elements of the project which may pose significant environmental consequences unless remedial measures are implemented to mitigate such problems. The EPP will detail environmental protection measures and may also include recommended monitoring programs. The EPP for the proposed project will focus on protection of the natural marine resources in the vicinity of the project site.

B. CORAL PROTECTION

Although few corals exist at the proposed wrecksite, those in place should be preserved. Locating the wreck away from any of the boulder/rubble areas will assure that no corals are damaged during the construction process. This can easily be done because large expanses of sand exist between the boulder/rubble areas. Almost all the corals are encrusting species, so students and tourists visiting the site (once it is in operation) will not likely damage the corals while snorkeling, diving, or during archaeological studies. In addition, pre-dive briefings on coral protection will be given to all divers and dive guides will accompany dive groups to help ensure that coral colonies and other sensitive marine organisms are not damaged.

A potential for damage exists from anchors falling on the boulder/rubble areas from boats above. This damage would be greatly decreased by constructing permanent buoys within the site. Boats would then not need to drop anchor during visits to the site.

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APPENDIX A
TABLES

Table 1. Checklist and relative abundance of algae observed at the Cocos Lagoon wrecksite.

Relative Abundance

A	=	Abundant
C	=	Common
R	=	Rare
*	=	Not found
**	=	Many unattached and washed in from other areas.

SCIENTIFIC NAME	STATIONS A	B	C
Dictyota bartayressi	C	C	C
Halimeda opuntia	R**	R**	*
H. macroloba	R**	R**	R**
Padina tenuis	C	R	R
Porolithon onkodes	C	C	C
Sargassum cristaefolium	C**	C**	C**
Sporolithon sp.	A	A	A
Turbinaria ornata	A**	A**	A**
Valonia ventricosa	*	R	*
Misc. algal scum	C	C	C
Unidentified red turf	R	*	*
Total Genera	9	9	8
Total Species	10	10	8

Table 2. Checklist and relative abundance of corals observed at the Cocos Lagoon wrecksite.

Relative Abundance
A = Abundant
C = Common
R = Rare
* = Not found

SCIENTIFIC NAME	STATION A	B	C
Astreopora myriopthalma	C	C	C
Favia pallida	*	R	*
F. matthaii *	R	*	
Goniastrea edwardsi	*	R	*
Leptastrea purpurea	A	A	A
Montipora foveolata	R	*	*
M. verrucosa	*	R	*
Plerogyra sinuosa	R	R	*
Pocillopora damicornis	*	R	*
Porites lutea	R	R	*
Stylocoeniella armata	C	C	C
Total Genera	6	9	4
Total Species	6	10	4

Table 3. Checklist and relative abundance of echinoderms observed at the Cocos Lagoon wrecksite. The species listed as occuring (X) at Station N are those that were observed only during the night survey.

Relative Abundance

A	=	Abundant
C	=	Common
R	=	Rare
*	=	Not found
**	=	One found in general area, and evidence of feeding found at all stations.

SCIENTIFIC NAME	A	B	C	N
SEA CUCUMBERS				
Actinopyga echinites	*	R	*	
A. mauritiana C	C	*		
Bohadschia argus	C	C	C	
B. marmorata *	R	*		
Holothuria atra	A	A	A	
H. axiologa	*	C	C	
H. edulis	A	A	A	
H. hilla	C	*	R	
H. impatiens R	*	*		
Stichopus chloronatus	C	C	C	
S. horrens				X
Synapta maculata	C	C	C	
Thelenota ananas	R	*	R	
MISCELLANEOUS ECHINODERMS				
Acanthaster planci	* *	* *	* *	
Culcita novaeguineae	*	R	*	
Diadema sp.	*	R	*	
Echinothrix diadema				X
Echinometra mathaei	R	R	R	
Linkia laevigata	C	C	C	
Linkia multifora	R	*	*	
Unidentified starfish sp. 1	*	R	*	
Total Genera	9	11	7	2
Total Species	12	14	10	2

Table 4. Checklist and relative abundance of invertebrates observed at the Cocos Lagoon wrecksite. Species listed as occuring (X) at Station N are those that were observed only during the night survey

Relative Abundance

A = Abundant
C = Common
R = Rare
* = Not found

SCIENTIFIC NAME	STATIONS A	B	C	N
Cnidarians				
Heteractis magnifica (large anemone)	*	*	R	
Actinodendron plumosum	*	R	*	
Small anemone	R	*	*	
Small anemone (on hermit crab shell)				X
Zoanthids	C	C	*	
Sinularea polydactyla	A	A	A	
Ascidians and Sponges				
Yellow ascidians	C	C	C	
Orange ascidians	R	*	*	
Orange sponges	C	C	C	
Yellow sponges	C	C	C	
Mollusks				
Nudibranch sp. 1 (pink, blue stripe)	R	*	*	
Nudibranch sp. 2 (black, white spots)	*	R	*	
Tridacna maxima	C	C	C	
Terebra maculata				X
Conus literatus				X
Conus sp.				X
Cypraea lynx				X
Cypraea moneta				X
Octopus sp.				X

Table 4. (continued)

Miscellaneous				
Featherduster worms	C	R	R	
Stenopus hispidus				X
Small sand shrimp				X
Mantis shrimp				X
Large red hermit crab				X
Hermit crab with anemones on shell				X
Benthic Foraminifera (.5 cm discs)	*	C	C	
Total	10	10	8	12

Table 5. Checklist and relative abundance of fish observed at the Replica Galleon site. Species listed as occuring (X) at Station N/S are those that were observed during the night survey or general reconnaissance swims.

Relative Abundance

A	=	Abundant
C	=	Common
U	=	Uncommon
*	=	Not found

SCIENTIFIC NAME	STATIONS A	B	C	N/S
DASYATIDIDAE (Stingrays)				
Dasyatus kuhlii	*	*	*	X
MURAENIDAE (Moray Eels)				
Gymnothora rueppelliae	*	*	*	X
HOLOCENTRIDAE (Squirrelfishes)				
Neoniphon sammara	*	*	*	X
Sargocentron diadema	*	*	*	X
S. microstoma	*	*	*	X
S. spiniferum	*	U	*	*
SCORPAENIDAE (Scorpionfishes)				
Pterois volitans	*	U	*	X
SERRANIDAE (Groupers)				
Cephalopholis urodeta	*	U	*	*
Epinephelus merra	*	*	*	X
APOGONIDAE (Cardinalfishes)				
Apogon cyanosoma	*	*	C	*
A. fraenatus	*	*	*	X
A. novemfasciatus	*	U	*	X
Cheilodipterus quinquelineata	U	*	*	*
CARANGIDAE (Jacks)				
Caranx melampygus	*	*	*	X
NEMIPTERIDAE (Breams)				
Scolopsis ineatus	*	*	*	*
LETHRINIDAE (Emperors)				
Gnathodentex aurolineatus	*	*	*	X
Lethrinus harak	*	*	U	*
L. ramak	*	*	*	X

Table 5 (cont.)

SCIENTIFIC NAME	STATIONS A	B	C	N/S
MULLIDAE (Goatfishes)				
Mulloides flavolineatus	*	*	*	X
Parupeneus barberinus	U	*	U	*
P. multifasciatus	*	U	U	X
CHAETODONTIDAE (Butterflyfishes)				
Chaetodon auriga	U	U	*	*
C. citrinellus	U	U	U	*
C. ephippium	U	U	*	*
C. lunula	*	U	U	X
POMACENTRIDAE (Damselfishes)				
Adudefduf sexfasciatus	*	*	U	*
Amblyglyphidodon curacao	*	*	U	*
Amphiprion perideraion	*	*	U	X
Chrysiptera biocellata	*	*	*	X
C. traceyi	*	*	U	*
Chromis viridus	C	A	U	*
Dascyllus aruanus	C	U	U	*
D. trimaculatus	U	U	C	X
Plectroglyphidodon leucozonus	U	*	U	*
Pomacentrus pavo	A	A	A	X
P. vaiuli	U	*	U	*
Stegastes sp.	*	U	*	*
LABRIDAE (Wrasses)				
Halichoeres trimaculatus	C	C	C	*
Labroides dimidiatus	U	U	U	*
Stethojulis strigeventor	U	U	U	*
Thalassoma hardwickii	*	*	U	*
Unidentified wrasse	U	*	*	*
SCARIDAE (Parrotfishes)				
Scarus ghobban	*	*	*	X
S. sordidus	*	U	*	*
BLENNIIDAE (Blennies)				
Unidentified blenny	*	*	U	*
MICRODESMIDAE (Dartfishes)				
Ptereleotris microlepis	C	*	C	*
GOBIIDAE (Gobies)				
Amblygobius phalaena	*	U	*	*

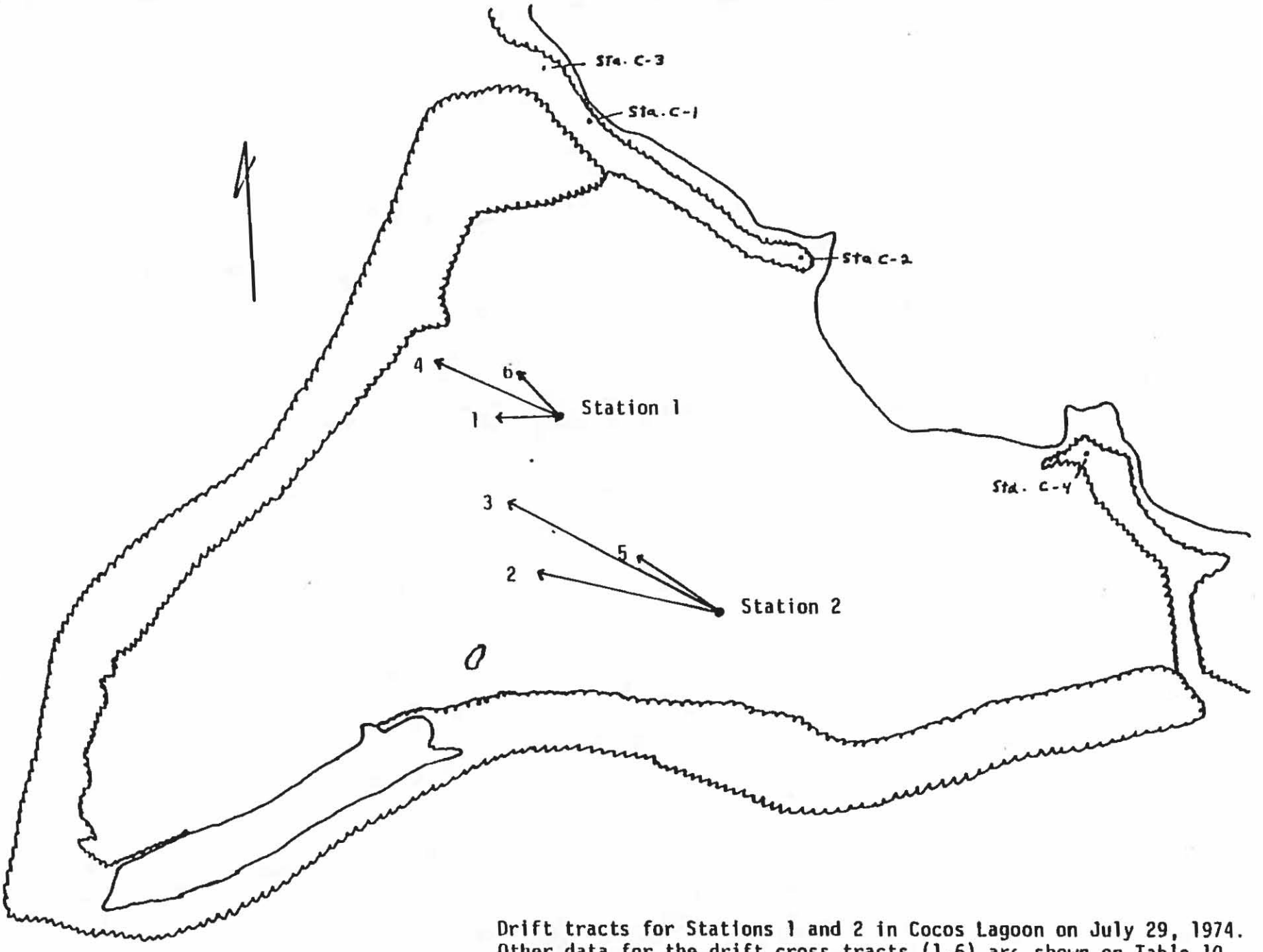
Table 5 (cont.)

SCIENTIFIC NAME	STATIONS A	B	C	N/S
Valenciennea strigatus	U	U	*	*
ACANTHURIDAE (Surgeonfishes)				
Acanthurus olivaceus	*	*	U	*
A. triostegus	*	C	U	*
A. xanthopterus	*	U	U	X
Ctenochaetus striatus	U	U	*	X
Zebrasoma veliferum	*	*	*	X
ZANCLIDAE (Morish Idol)				
Zanclus cornutus	*	U	U	*
SOLEIDAE (Soles)				
Soleichthys heterorhinos	*	*	*	X
BALISTIDAE (Triggerfishes)				
Rhinecanthus aculeatus	*	*	U	*
TETRAODONTIDAE (Duffers)				
Arothron manilensis	*	U	U	X
Canthigaster solandri	*	*	*	*
Canthigaster sp.	U	*	*	*
Total Species Per Station	19	25	28	25
Total Species - - Entire Site	59			

APPENDIX B

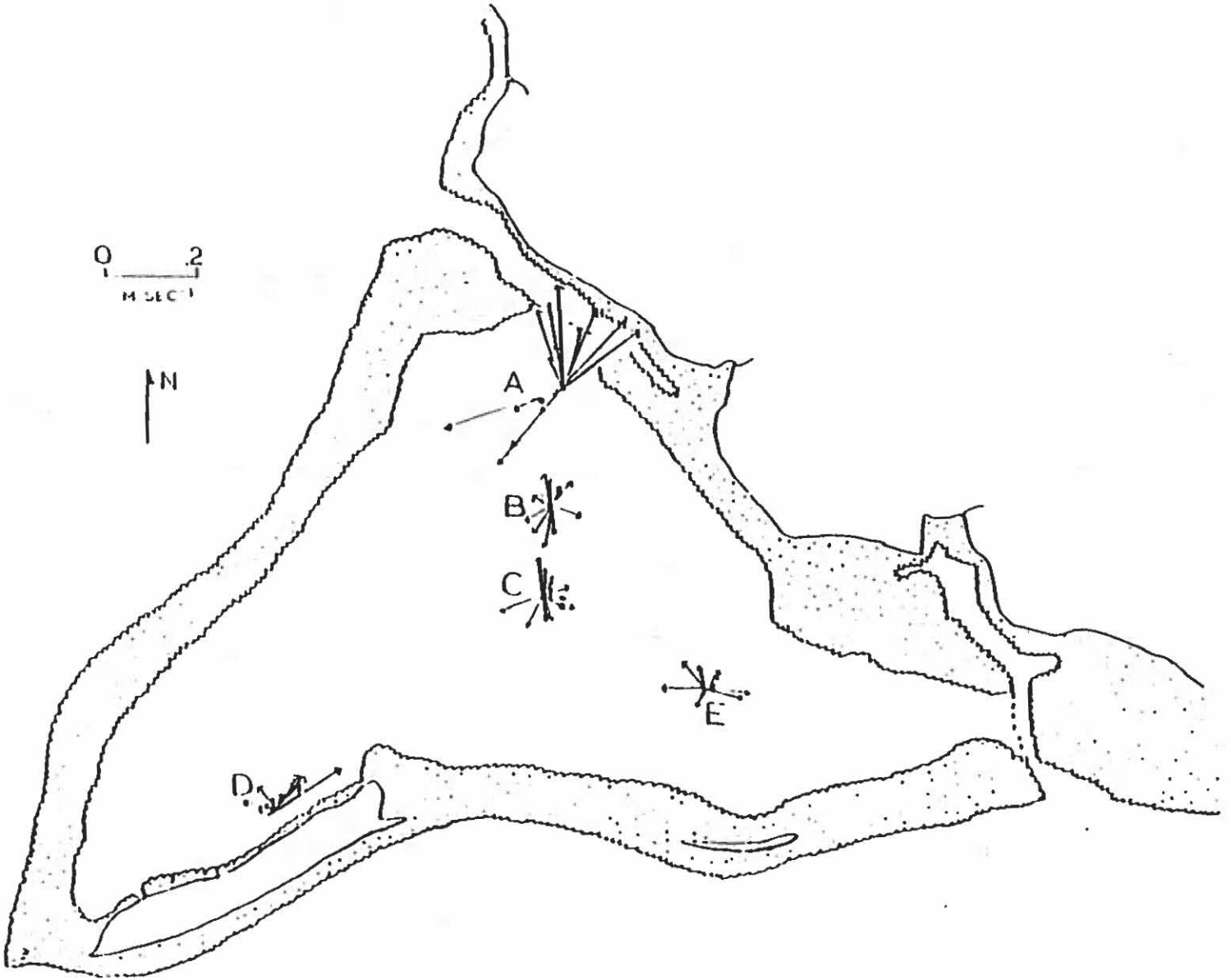
Water current observations in Cocos Lagoon

(Randall et. al., 1972 and Randall R.H. and T.S.Sherwood, 1982)



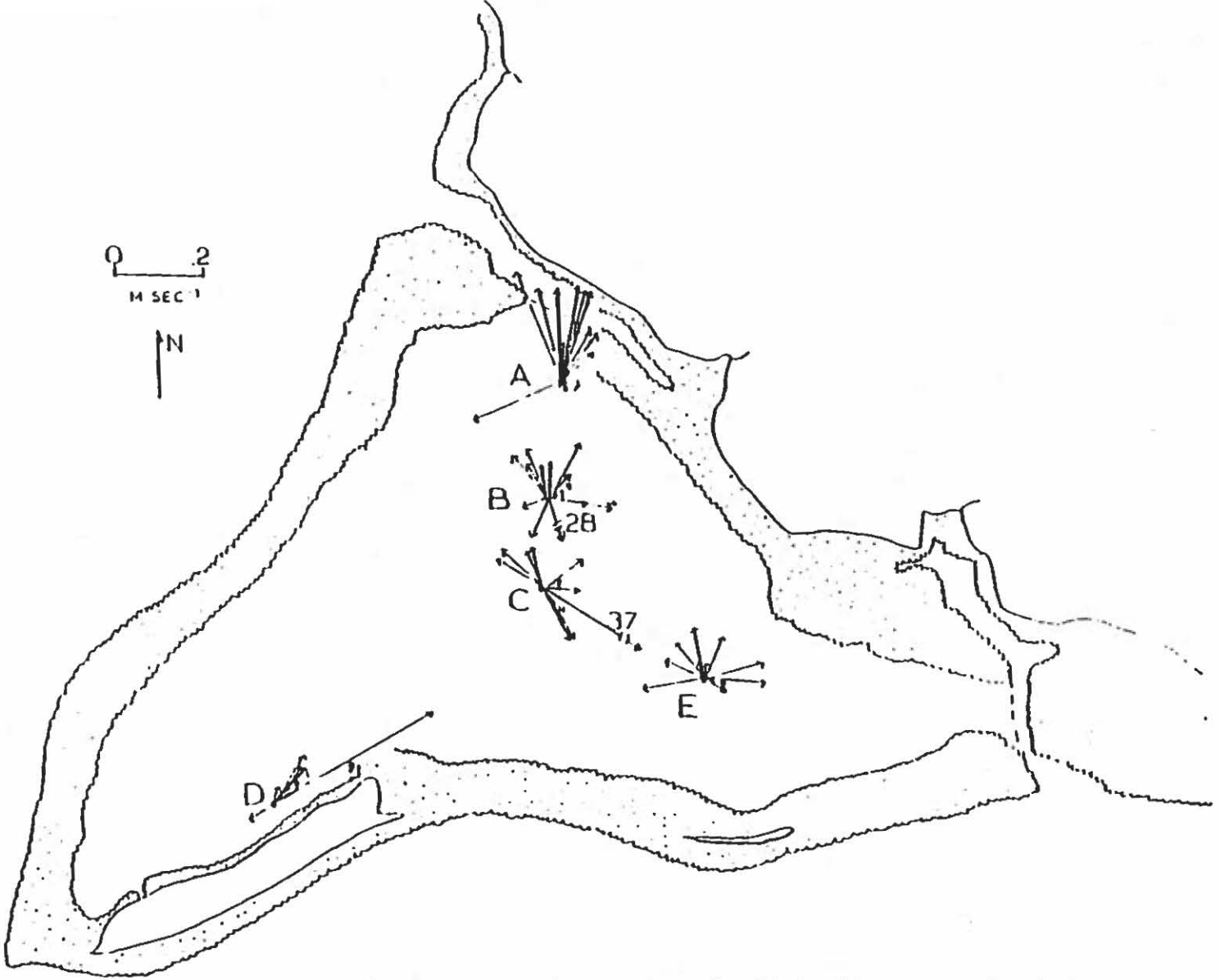
Drift tracts for Stations 1 and 2 in Cocos Lagoon on July 29, 1974. Other data for the drift cross tracts (1-6) are shown on Table 10. The locations of other current studies are also shown.

Randall R.H., et. al.. 1975



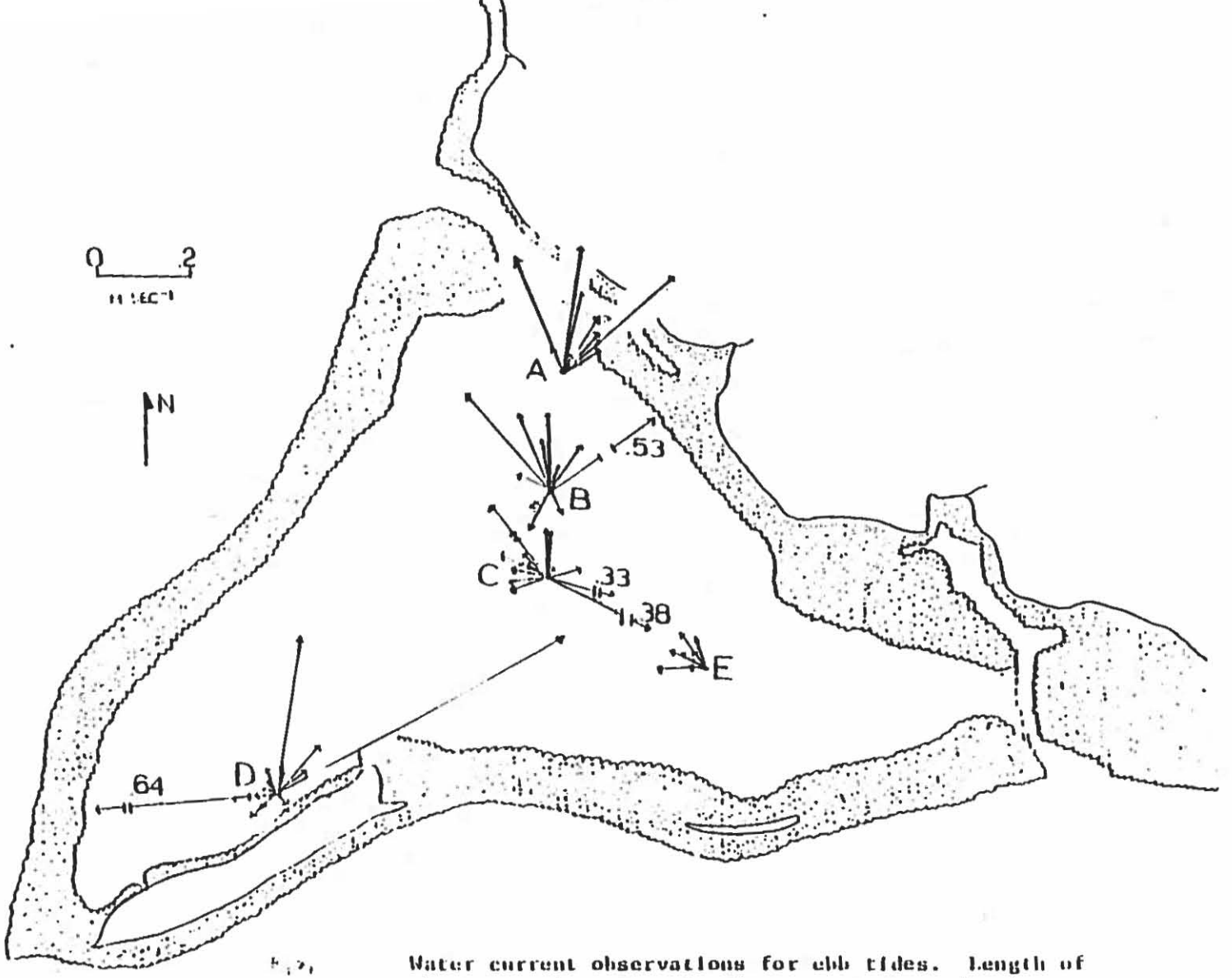
Water current observations for flooding tides. Length of the arrows is proportional to current speed. Arrows with open heads represent neap tides and those with closed heads represent spring tides.

Randall R.H. and T.S. Sherwood, 1982.



Water current observations for high tides. Length of the arrows is proportional to current speed. Arrows with open heads represent neap tides and those with closed heads represent spring tides.

Randall R.H. and T.S. Sherwood, 1982.



Water current observations for ebb tides. Length of the arrows is proportional to current speed. Arrows with open heads represent neap tides and those with closed heads represent spring tides.

Randall R.H. and T.S. Sherwood. 1982.

APPENDIX C

Photographs

Photo 1. Sandy habitat at the project site.

Photo 2. Boulder/rubble habitat at the project site.

Photo 3. Large boulder within the project site.

Photo 4. Soft coral (Sinularea polydactyla) encountered in the boulder/rubble areas.

Jan Mansfield
O'Neill Mansfield Engineers
P.O. Box 4314
Agana, Guam 96910
Phone/Fax: 671-646-2400

January 8, 1992

Mr. Francis M. Dayton
Chief, Guam Operations Office
Department of the Army, Corps of Engineers
238 Archbishop F. C. Flores Street
Agana, Guam 96910

Re: Proposal for Antiquaria, a Replica of the Shipwrecked Spanish-Manila Galleon, the Nuestra Senora del Pilar de Saragosa y Santiago, to be placed in Cocos Lagoon

Dear Mr. Dayton;

We are requesting a Department of the Army, Corps of Engineers permit for the proposed Antiquaria project. The goal of the project is to establish ecotourism as a viable resource on Guam. Guam's past development has not focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities - for the citizens of Guam, tourists, and professionals alike. The proposed Antiquaria does just that - and the project is designed to preserve and enhance, rather than harm, the natural environment. The proposed project is to establish a replica of the 17th century galleon Pilar's wrecksite at a safe location within Cocos Lagoon. The wrecksite would be used as a facility for training students in marine archaeology and as field assistants for the Pilar salvage project, as a tourist attraction, and as an educational tool for Guam's youth - to provide a realistic glimpse of the island's heritage, and for creating environmental awareness.

Enclosed for your review is the Department of the Army, Corps of Engineers permit application. Also enclosed for your information are the project proposal, project maps and drawings, the Environmental Impact Assessment, a copy of the Guam Coastal Management Program Federal Consistency application, a copy of the Guam DRC/TSPC application, a copy of the Guam Environmental Protection Agency 401 Water Quality Certification request, and a copy of the U.S. Coast Guard Private Aids to Navigation application.

Please review the enclosed information and address your findings to this office.

If you have any questions or desire additional information, please do not hesitate to contact me.

Sincerely,

Jan Mansfield

Jan Mansfield,
Project Engineer

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0702-0036
Expires 30 June 1989

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine, Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application *(see sample drawings and instructions)* and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

APPLICATION NUMBER *(To be assigned by Corps)*

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT
Jan Mansfield
O'Neill Mansfield Engineers
PO Box 4314
Agana, Guam 96910
Telephone no. during business hours
A/C (671) 649-9014 *(Residence)*
A/C (671) 646-2400 *(Office)*

NAME AND ADDRESS OF APPLICANT
John Bent
James Cruz
for Antiquaria
PO Box 1649
Agana, Guam 96910
Telephone no. during business hours
A/C ( ) _____ *(Residence)*
A/C (671) 477-3681 *(Office)*

Statement of Authorization: I hereby designate and authorize _____ JAN MANSFIELD _____ to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.

SIGNATURE OF APPLICANT

DATE 1/9/92

DETAILED DESCRIPTION OF PROPOSED ACTIVITY

ACTIVITY The proposed project is to build and place a replica of the 17th century Spanish Manila galleon, the Nuestra Senora del Pilar de Saragosa y Santiago which was shipwrecked off Cocos Island on June 2, 1690. The wreck has been located and archaeological excavation will begin soon headed by Mr. John Bent and James Cruz of the Pilar Project Ltd. The construction and layout of the replica galleon will be designed to simulate the wreckage of a typical 17th century galleon, with scattering of various genuine & replica artifacts placed at the wrecksite. The wrecksite will be used as a facility for training students in marine archaeology, as a tourist attraction, and as an educational tool for Guam's youth - to provide a realistic glimpse of the island's heritage.

PURPOSE None of Guam's past development has focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities. The Antiquaria project represents and ecotourism opportunity that would be unique to Guam. A tour package would consist of a briefing of the history of the actual wreck and a snorkeling or diving tour of the replica wrecksite with supervision. A large audience within the general public have some exposure to marine archaeology through books, documentaries, and magazines. The replica galleon will tap that interest and give both tourists and residents the opportunity for an experience that they will not match anywhere else in the world. Actual artifacts will find a home in Guam's museums where people can enjoy them in safety and beauty in the lagoon.

DISCHARGE OF DREDGED OR FILL MATERIAL

There will be no discharge of fill material. Concrete support beams will be placed in the lagoon sand bottom to secure the wooden replica shipwreck. Approximately 30 cubic yards of sand will be displaced by the concrete support beams. This sand will be allowed to settle againstthe shipwreck structure, creating interesting mounds in the seascape.

NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ALSO ADJOINS THE WATERWAY

Government of Guam

WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED

Cocos Lagoon. Please see attached location map.

LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED

ADDRESS: In Cocos Lagoon adjacent to Merizo, Guam
Please see attached location map.

STREET, ROAD, ROUTE OR OTHER DESCRIPTIVE LOCATION

COUNTY STATE ZIP CODE

Government of Guam, Department of Parks & Recreation

LOCAL GOVERNING BODY WITH JURISDICTION OVER SITE

Is any portion of the activity for which authorization is sought now complete? ☐ YES ☒ NO
If answer is "Yes" give reasons, month and year the activity was completed. Indicate the existing work on the drawings.

List all approvals or certifications and denials received from other federal, interstate, state or local agencies for any structures, construction, discharges or other activities described in this application.

ISSUING AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE OF APPLICATION	DATE OF APPROVAL	DATE OF DENIAL
Guam BoP	GCMP		January 8, 92	PENDING	
Guam DRC/TSPC	Seashore		January 8, 92	PENDING	
GEPA 401 WQ	Certification		January 8, 92	PENDING	
Coast Guard	Aids to Nav		January 8, 92	PENDING	

Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT — 1/9/92 DATE — Jon Mansfield SIGNATURE OF AGENT — 1/9/92 DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858

PODCO-O

Dear Applicant:

A complete Department of the Army Permit Application consists of the application form (Eng Form 4345), drawings, and environmental information. Based on our past experiences, the District Engineer has discovered that much environmental information is often lacking when the application is submitted. As a result, delays in processing the permit application often occur. In order to provide prompt processing of your permit application and thereby reduce the possibility for delays, the following questions have been provided for your use if you so desire.

If you should decide to answer these questions, please provide only that information that applies to your proposed project, using readily available information and answering the questions as best you can. The more information you provide, the quicker we can process your application.

Name of Applicant: Antiquaria

Prepared by: Jan Mansfield

Date: January 8, 1992

A. PROJECT DESCRIPTION (Submit plans) See Appendix B

1. What is the basic purpose of your proposal? To provide a unique underwater museum-type environment to display a replica of the Spanish galleon shipwreck with artifacts.

2. Do you plan to dredge anywhere in the water? NO. If so,

   a. Where do you plan to dredge? _____

   b. What type of material will be dredged? _____

   c. How long do you plan to dredge? _____

   d. How much material will be dredged (volume and area)? _____

   e. What methods will be used? _____

3. Do you plan to discharge dredged or fill material into water areas, including wetlands? Concrete support beams will be placed on the sand bottom.

Do you plan to transport dredged material for the purpose of disposing it in the ocean? NO

If yes to either question,

a. What is the purpose of the discharge? _____

b. Where do you plan to discharge/dispose of the material? _____

c. What is the source of the material? _____

d. What is the type and composition of the material? _____

e. How much material will be discharged? Area _____

Volume _____

f. How long do you plan to discharge? _____

g. What is the method of transportation to be used? _____

h. What is the method of discharge or disposal? _____

4. Do you plan to construct any structures? If so,

a. What specific structures will be constructed (type and size)? Three 18" X 18" X 120' long concrete support beams, and Four 6" X 18" X 25' long concrete support beams.

b. What will the structures be used for? To align and hold the timber replica of a Spanish galleon shipwreck. Please see drawings in Appendix B.

5. Are there other activities in the area similar to your proposed activity?

dredge site? NO

discharge site N/A

construction site NO

B. ALTERNATIVES

1. List other sites which may be suitable for this proposal and indicate whether these are or could become available to you. If none, explain why. Other sites in the lagoon were evaluated but were inferior due to considerations of: 1) Good underwater visibility; 2) Soft sandy bottom without a lot of coral growth; 3) Safe wave and underwate current conditions; 4) avoidance of popular boating waterways; 5) avoidance of popular fishing areas; 6) adequate depth; 7) Stable bottom composition, so no stirring of bottom from diver disturbance. Other sites evaluated were inferior to the final site selected due to these seven criteria.

2. List other methods or project designs which would fulfill the basic purpose of your proposal. Which ones are reasonable for you? If none, explain why. Artifacts from the actual shipwreck could be placed in a dusty museum somewhere, but they would not have the same relevance or impact that they would have being placed on a replica shipwreck. The artifacts could be cleaned and replaced at the actual shipwreck site, but the wave and underwater current conditions are extremely dangerous. One could do nothing, but Guam would miss the opportunity to promote both her unique history and her beautiful marine environment.

3. If your permit application were denied, what other alternatives would you have? None. Artifacts would be sold or stored in a museum somewhere.

C. EXISTING ENVIRONMENT (submit photos if available)

1. Physical Environment

a. How would you generally describe the project area at the site?

dredge site _____

discharge site _____

construction site 12 to 16-feet deep lagoon with sandy bottom with some rock, coral, and rubble in scattered locations.

b. What kind of substrate (ground) is found at the site?

dredge site _____

discharge site _____

construction site Sandy lagoon floor.

c. What is the range of water levels which occur (during normal tides and during storm or flood periods) at the site?

dredge site _____

discharge site _____

construction site Mean tide range is 1.6 feet. Spring tide range is 2.3 feet.

d. Describe the water currents and water circulation patterns at the site. See EIA in Appendix C.

dredge site _____

discharge site _____

construction site Cocos Lagoon is protected from large waves by the reefs. ~~Waves are short period windwaves generated by tradewsinds from the northeast through southeast.~~

e. What is the salinity (salt, brackish, or fresh) of the water at the site?

dredge site _____

discharge site _____

construction site Salt water

f. What is the quality of the water at the site?

dredge site _____

discharge site _____

construction site GEPA classification M-1, Excellent. Measured turbidities of 0.06 NTU and 0.08 NTU.

g. Is this area a groundwater recharge area? NO

h. What is the history or possibility of contaminants/pollutants in the substrate (soil) at the source of fill material?

dredge site _____

discharge site _____

construction site None.

i. Have there been problems with erosion at or near the site?

dredge site _____

discharge site _____

construction site No.

j. Is the site located in or near a drainageway of flood plain?

dredge site _____

discharge site _____

construction site No.

k. What is the quality of the air at the site?

dredge site _____

discharge site _____

construction site Excellent.

l. What are the existing noise levels at the site?

dredge site _____

discharge site _____

construction site Low except for occassional jet-skis.

2. Biological Environment (attach biological survey reports, if available) Please see EIA in Appendix C.

a. What kinds of plants are mainly found at or near the site?

dredge site _____

discharge site _____

construction site Algae - 11 species. Hard & soft corals, lfish, seagrasses (sporadic plant) and macroinvertebrates.

b. What kinds of animals are mainly found at or near the site?

dredge site _____

discharge site _____

construction site Macroinvertebrates, fish.

c. Please list any plants or animals found at or near the project area that are considered rare or otherwise important. _____

Sea Turtles have been seen in Cocos Lagoon. In 1974 a ~~Dugong dugong (sea cow) was sighted.~~

3. Special Sites. Is the project site located at or near any of the following areas?

		Dredge site	Discharge site
a.	Sanctuaries and Refuges (protected wildlife area)		
b.	Wetlands (swamps, marshes, bogs)		
c.	Mudflats		
d.	Vegetated Shallows (seagrass bed)		
e.	Coral Reefs		
f.	Riffle and pool complexes		

4. Human Use Characteristics

a. What is the existing land use zoning for the site?

dredge site _____

discharge site _____

construction site Territorial Seashore Park

b. What is on the land (including dwellings) at or near the site?

dredge site _____

discharge site _____

construction site Nothing

c. Do any of the following occur at or near the site?

	Dredge site	Discharge site	Construction site
Local fresh water supply			NO
Fishing (recreational, commercial)			Recreational
Scenic areas			YES
Agriculture (type)			NO
Aquaculture (type)			NO
Historic sites (type)			NO
Other cultural resources (type)			NO
Parks, monuments, preserves, etc.			YES
Other (type)			

D. ENVIRONMENTAL EFFECTS

Briefly describe the environmental effects which may be expected as a result of your proposal, referring to the items listed in Section C above.

1. **Physical Environmental (effects on land, water, air, soil, etc.)**
Human traffic through an underwaater environment will be greatly increased. New fish habitats will be created, creating an underwater 'conservation area'.

2. **Biological Environment (effects on plants, animals, and habitats)**
New fish habitats will be created. New structures for coral growth will be placed.

3. **Special Sites (effects on parks, ruins, monuments, etc.)**
The present park will be enhanced by this historical monument.

4. **Human Use (how existing human activiaties would be affected)**
Jet-skiing and boating will need to avoid the area for safety to divers and swimmers. Fishing will be restricted to night with shallow lines or not allowed at all. Swimming, snorkeling, and diving will increase greatly.

5. **Indirect Impacts (Will the project eventually encourage or discourage residential agriculture, urban, industrial, or resort activities?)** It will encourage local commercial ventures to bring recreational tours to the site through boat tours.

6. **Cumulative Impacts (Is this project similar in purpose, characteristics, and location compared to previous projects? Will this project lead to or be followed by similar projects?)**
This project will show that ecotourism with a sensitivity to enhancing and promoting the beauty of the natural environment are viable investments in Guam.

7. **Other**

E. MITIGATION

What can you do to minimize adverse effects of your proposal on the environment? Educate the general public on the benefits of such an historic underwater park; Work with the University of Guam in utilizing the site for accredited marine archaeology courses; Provide free lectures and tours to loacl school, civic and family groups.

F. COORDINATION WITH OTHERS

List any agencies, organizations, or individuals with whom you have consulted regarading environmental concerns.

Mayor Buck Cruz of Merizo
Guam Department of Agriculture: Gerry Davis, Bob Anderson
Dr. Bob Richmond of University of Guam Marine Lab
Dr. Hiro Kurdshina, Dr. Dirk Ballendorf, Ms. Marjory Driver of MARC
Mr. Richard Davis of Guam Department of Parks & Recreation, HPO

G. ADDITIONAL INFORMATION

Use this space to provide additional comments or to complete your response to items above (indicate item number).

Thank you for your cooperation in this matter. If you have any questions, please contact my Operations Branch at 438-9258.

Jan Mansfield
O'Neill Mansfield Engineers
P.O. Box 4314
Agana, Guam 96910
Phone/Fax: 671-646-2400

January 8, 1992

DRC Members
c/o Mr. Felix Dungca
Chief Planner
Department of Land Management - Planning Division
P.O. Box 2950
Agana, Guam 96910

Re: Proposal for Antiquaria, a Replica of the Shipwrecked Spanish-Manila Galleon, the Nuestra Senora del Pilar de Saragosa y Santiago, to be placed in Cocos Lagoon

Dear Committee Members;

We are requesting Development Review Committee and Territorial Seashore Protection Commission review and approval for the proposed Antiquaria project. The goal of the project is to establish ecotourism as a viable resource on Guam. Guam's past development has not focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities - for the citizens of Guam and tourists alike. The proposed Antiquaria will do that - and the project is designed to preserve, enhance, and promote the natural environment, rather than harm the environment. The proposed project is to establish a replica of the 17th century galleon Pilar's wrecksite at a safe location within Cocos Lagoon. The wrecksite would be used as a facility for training students in marine archaeology and as field assistants for the actual Pilar salvage project, as a tourist attraction, as an educational tool - to provide a realistic glimpse of the island's heritage, for creating environmental awareness, and as an underwater museum to house genuine and replica artifacts from the real Pilar shipwreck.

Enclosed for your review is the DRC/TSPC permit application and justification letter. Also enclosed for your information are the project proposal, project maps and drawings, the Environmental Impact Assessment, a copy of the Guam Coastal Management Program Federal Consistency application, a copy of the U.S. Army Corps of Engineers application, a copy of the Guam Environmental Protection Agency 401 Water Quality Certification request, and a copy of the U.S. Coast Guard Private Aids to Navigation application.

We trust that you will find the application and supporting data to be in order. Please review the enclosed information and forward your findings to the Territorial Seashore Protection Commission for their review and approval.

Sincerely,

Jan Mansfield

Jan Mansfield,
Project Engineer

SEASHORE CLEARANCE

TO: Administrator, Territorial Seashore Planning Commission
C/O Planning Division, Department of Land Management
Government of Guam, Agana, Guam Mariana Islands 96910

The undersigned owner(s)/lessor(s) of the following described property, situated with the ten (10) meters inland from the mean high water mark (MHWM) or situated seaward to the ten (10) fathom contour, do hereby requests consideration for a Seashore Clearance Permit.

1. Information on Applicant:

Name of Applicant: James Cruz & John Bent for Antiquaria

Mailing Address: PO Box 1649, Agana, Guam 96910

Telephone No.: Business 671-477-3681 Home _____

2. Location, Description, and Ownership:

Lot: Cocos Lagoon Block: _____ Tract: _____

Lot Area (In Square Meters & Feet): 6,131 SM = 66,000 SF = 1.5 Acres

Municipal District: Merizo Municipality: Merizo

Registered Owner: Government of Guam: Dept of Parks & Recreation
Applicant will apply for Submerged Land Lease

Certificate of Title No.: _____ Recorded Document No.: _____

3. Current and Proposed Land Use:

Current Use: Underwater: Territorial Seashore Park Zoned: Water

Proposed Use: Underwater: Spanish Galleon Shipwreck & Marine Museum

Master Plan: Seashore Park

4. Attach a typed, brief and concise justification (letter format) explaining the compatibility of the proposed project with adjacent and neighborhood developments as they exist and the nature of request in accordance with the Territorial Seashore Protection Act, Title XIV, Section 13417a(2):

   a. That the development will not have any substantial adverse environmental or ecological effect; and
   b. That the development is consistent with the purpose and objectives of Chapter V-A, Section 13411. The applicant shall have the burden of proof on all issues;
   c. That access to beaches, recreation and historical areas, and natural reserves is increased to the maximum extent possible by appropriate dedication;
   d. That there is no substantial interference with or detraction from the line of sight toward the sea from the territorial highway nearest the coast;
   e. That adequate and properly located public recreation areas and wildlife preserves are reserved;
   f. That provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon coastal reserve resources; and
   g. That alterations to existing land forms and vegetation, and construction of structures shall cause minimum danger of floods, landslides, erosion or siltation.

5. If applicant has submitted to the Territorial Land Use Commission other request on subject property, applicant shall list them:

_____

_____

_____

SEASHORE CLEARANCE

6. Supporting Information. The following information must be attached to this application:

a. Plans, drawn to scale, showing dimensions and shape of lot; lot size; size and location of existing building(s); location and dimensions of proposed building(s) or alterations;
b. 8½" x 14" map, drawn to scale, showing all land zones within 1000 feet radius of subject lot's boundaries;
c. 8½" x 14" map, drawn to scale, showing all building/uses within 750 feet radius of subject lot's boundaries. On the same map, applicant must also show any natural or topographic peculiarities of said lot.
d. 8½" x 14" map, drawn to scale, showing all parcels with correct lot number within 500 feet radius of subject lot's boundaries.
e. Using TPSC Form 002 provide a listing of all property owners within 500 feet radius of subject lot's boundaries. All is defined as person(s) having legal title to affected adjacent properties;
f. The most recent recorded and certified Department of Land Management survey map showing the subject property;
g. An initial comprehensive environmental impact assessment as required by the Administrator; and
h. An erosion control plan;
i. If leased, lease assignment and covenant;
j. Additional information as required by the Administrator.

7. Approval from the commission does not constitute a waiver from permits required by other government agencies including the U.S. Army Corps of Engineer, nor does this approval imply that these permits will subsequently be granted.

8. Required Signatures: All legal owners or lessors of designated parcel shall sign form with name(s) typed or handwritten, signed and dated:

I hereby certify that all information contained in this application and its supplements is true and correct. I also understand that any misrepresentation in this application will void the entire submission. Further, that twenty-five (25) sets of the above listed required information shall be provided.

_____ 1/9/92
(Owner(s) or Lessor(s) and Date)

Jon Mansfield 1/9/92
(Representative, if any, and Date)

THIS FORM SHALL NOT BE MAILED. APPLICANT(S)/REPRESENTATIVE(S) SHALL SUBMIT IN PERSON, BY APPOINTMENT ONLY, TO THE PLANNING DIVISION, DEPARTMENT OF LAND MANAGEMENT.

FOR OFFICIAL USE ONLY

Date Filed: _____ Accepted By: _____

Date of Notice in Newspaper(s): _____

Date of Notice to Adjacent Property Owners: _____

Date of Public Hearing: _____

Filing Fee(s) Paid: Yes ☐ No ☐ Check ☐ Cash ☐ Other ☐ _____

Receipt No.: _____ Application Number: _____

Date of TSPC Action: _____ Conditions: Yes ☐
No ☐ (See Below)

Conditions of Approval:

Jan Mansfield
O'Neill Mansfield Engineers
P.O. Box 4314
Agana, Guam 96910
Phone/Fax: 671-646-2400

Proposal for Antiquaria
A Replica of the Shipwrecked Spanish-Manila Galleon
The Nuestra Senora del Pilar de Saragosa y Santiago
To be placed in Cocos Lagoon

January 8, 1992

JUSTIFICATION

We are requesting Development Review Committee and Territorial Seashore Protection Commission review and approval for the proposed Antiquaria project. Below is a brief justification as requested on the Seashore Clearance application.

The project will not have any substantial adverse environmental or ecological effect. The goal of the project is to establish ecotourism as a viable resource on Guam. Guam's past development has not focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities - for the citizens of Guam and tourists alike. The proposed Antiquaria will do that. The project is designed to preserve, enhance, and promote the natural environment, rather than harm the environment. This pristine environment will be the setting of a unique underwater museum which will create a replica of the shipwrecked Pilar to house genuine and replica artifacts salvaged from the real shipwreck.

The development is consistent with the purpose and objectives of Chapter V-A, Section 13411 regarding the right of the people of Guam to maintain and appreciate their historic and environmental heritage. Antiquaria will relocate Guam's historic Spanish galleon shipwreck from outside the reef area of Cocos Lagoon to the safer, gentler waters of the lagoon so that all residents and visitors with minimal swimming abilities can enjoy the spectacle of the shipwreck as she was discovered underwater. In addition to the historic importance of Antiquaria, new marine habitats will be created by the shipwreck, so that the site will become in effect a marine conservation area within Cocos Lagoon. No such conservation area exists in the lagoon. Antiquaria combines both an historic and environmental encounter for the people of Guam to access freely, and for visitors to respect.

Access to recreational and historical areas and natural reserves is increased. Neither the wrecksite, the artifacts, nor a safe marine conservation area have been available to the general public before. The Pilar shipwreck is Guam's own unique treasure, highlighting a piece of Guam's unique history and the infuences which shaped her. How appropriate that the Spanish galleon Pilar be shown as a sunken ship, overcome by the strength of Guam's environment, with her treasures displayed intact as they have been for 300 years. With Antiquaria, new habitats will be created for marine growth to flourish. The area will be protected, so that the artifacts remain intact and the marine growth will not be damaged. Antiquaria will be free to Guam residents, by appointment, so that an overpopulation of boats and divers does not endanger the environment. A commercial fee will be charged to non-resident tourists.

There will be no substantial interference with or detraction from the line of sight toward the sea from the territorial highway nearest the coast. Antiquaria will be underwater. It will not be visible from the shore. To maintain the pristine cleanliness of the site, for security of the valuable artifacts, and to provide an orientation lecutre for visitors a pontoon-style boat will remain at the site at all times. The boat will barely be visible from the nearest shore which is approximately one mile distant. The boat will be new, and maintained clean to be visually inviting to visitors.

Adequate and properly located public recreation areas and wildlife preserves are reserved. Antiquaria will be the only marine conservation area within Cocos Lagoon. One cannot speculate on the potential marine life that will be free to develop. Sea Turtles, stingrays, dolphins, eels and many other marine animals have been seen in Cocos Lagoon. Anemones, soft and hard corals, and seagrasses grow in sporadic locations. It is hoped that these will flourish in the small but protected zone of the shipwreck. This will be available to swimmers, snorkelers, divers, and glass-bottom boat tours to appreciate along with the impact of the Spanish galleon shipwreck.

Provision is made for solid and liquid waste treatment, dispostion, and management. The pontoon-style lecture boat will be equipped with marine sanitation devices (MSD) inspected and approved by the U.S. Coast Guard. At no time will any sewage ever be deposited in the lagoon. The pontoon-style boat will be equipped with two working diesel engines. The boat will travel to Merizo on a regular basis to have the MSD pumped empty by a qualified wastewater truck contractor.

Alterations to existing land forms and vegetation, and construction of structures shall cause minimum danger of floods, landslides, erosion, or siltation. Concrete support beams shall be placed in 12-foot, 1.5-ton segments so that the beams will be easily handled underwater. The shipwreck timbers ribs shall be placed on the concrete support beams. The fastening of wood planks to the timer ribs will be done underwater. Each concrete support beam will displace one cubic yard of sand which will be mounded around the beam and shipwreck timber. The bottom currents are very small and the sand at the site resettles quickly within approximate 5-minute intervals. No preservatives will be used on the wood. This will allow corals to grow on the wood and will not poison marine life using the structure for habitat.

We trust that you will find the justification for Antiquaria to be in order.

Sincerely,

Jan Mansfield

Jan Mansfield,
Project Engineer

Jan Mansfield
O'Neill Mansfield Engineers
P.O. Box 4314
Agana, Guam 96910
Phone/Fax: 671-646-2400

January 8, 1992

Mr. Fred Castro
Administrator
Guam Environmental Protection Agency
Harmon Plaza Complex Unit D-107
130 Rojas Street
Harmon, Guam 96911

Subject: Proposal for Antiquaria - A Replica of the Shipwrecked Spanish-Manila Galleon, the Nuestra Senora del Pilar de Saragosa y Santiago to be placed in Cocos Lagoon

Dear Mr. Castro;

We are requesting a 401 Water Quality Certification for the proposed Antiquaria project.

Enclosed for your review are the project proposal with maps and drawings. Also enclosed for your supplemental information are the Guam Bureau of Planning Coastal Management Program application, the Guam DRC/TSPC application with justification; the Corps of Engineers permit application; and the U. S. Coast Guard Private Aids to Navigation Application.

The goal of the project is to establish ecotourism as a viable resource on Guam. Guam's past development has not focussed on Guam's unique island heritage and natural environmental splendors, and at the same time offered enjoyment, educational, and training opportunities - for the citizens of Guam and tourists alike. The proposed Antiquaria will do that. The project is designed to preserve, enhance, and promote the natural environment in Cocos Lagoon, rather than harm the environment. This pristine environment will be the setting of a unique underwater museum which will create a replica of the shipwrecked Pilar to house genuine and replica artifacts salvaged from the real shipwreck. Antiquaria seeks to relocate Guam's historic Spanish galleon shipwreck from outside the reef area of Cocos Lagoon to the safer, gentler waters of the lagoon so that all residents and visitors with minimal swimming abilities can enjoy the spectacle of the shipwreck as she was discovered underwater. In addition to the historic importance of Antiquaria, new marine habitats will be created by the shipwreck, so that the site will become in effect a marine conservation area within Cocos Lagoon. No such conservation area exists in the lagoon. Our goal for Antiquaria is to combine both an historic and environmental encounter for the people of Guam to access freely, and for visitors to learn, grow, and respect Guam's history and environment in the form of a tourist attraction.

Please review our information package and inform both ourselves and the U.S. Army Corps of Engineers of your findings. If you require any additional information, or have questions, please contact myself or Mr. James Cruz of Antiquaria.

Sincerely,

Jan Mansfield

Jan Mansfield

Jan Mansfield
O'Neill Mansfield Engineers
P.O. Box 4314
Agana, Guam 96910
Phone/Fax: 671-646-2400

January 8, 1992

Commander H. W. Motekaitis
U.S. Coast Guard
Chief, Aids to Navigation Branch
Fourteenth Coast Guard District
Prince Kalanianaole Federal Building
300 Ala Moanna Blvd.
Honolulu, Hawaii 96850-4982

Subject: Private Aids to Navigation Application for the proposed Antiquaria - A Replica of the Shipwrecked Spanish-Manila Galleon, the Nuestra Senora del Pilar de Saragosa y Santiago to be placed in Cocos Lagoon

Dear Commander Motekaitis,

Please review and approve our attached Private Aids to Navigation Application for the subject project. Attached for your information are the project proposal, location maps, and drawings. We are concurrently submitting permit applications for the project to the U.S. Army Corps of Engineers, the Guam Coastal Management Program, the Guam Development Review & Territorial Seashore Commission Committees, and the Guam Environmental Protection Agency for 401 Water Quality Certification. In addition we are forwarding a copy of all applications to Mr. David B. Tydingco of the Port Authority for Authority information. As I understand it, the Authority is not directly concerned with private aids to navigation in Cocos Lagoon. When the project is approved (or disapproved) by all permitting agencies, I will notify you so that you will be aware of the status of the project.

If you require any additional information, or have questions, please contact myself or Mr. James Cruz of Antiquaria.

Thank you.

Sincerely,

Jan Mansfield

Jan Mansfield

DEPARTMENT OF TRANSPORTATION
U.S. COAST GUARD
CG-2554 (Rev. 7-76)

PRIVATE AIDS TO NAVIGATION APPLICATION

(See attached instructions and copy of Code of Fed. Reg., Title 33, Chap. 1, Part 66)

Form Approved
OMB-004-R5681

NO PRIVATE AID TO NAVIGATION MAY BE AUTHORIZED UNLESS A COMPLETED APPLICATION FORM HAS BEEN RECEIVED (14 U.S.C. 83; 33 C.F.R. 66.01-5).

1. ACTION REQUESTED FOR PRIVATE AIDS TO NAVIGATION: A. [X] ESTABLISH AND MAINTAIN B. [ ] DISCONTINUE C. [ ] CHANGE D. [ ] TRANSFER OWNERSHIP

2. DATE ACTION TO START: July 1992

3. AIDS WILL BE OPERATED: A. [X] THROUGHOUT YEAR B. [ ] TEMPORARILY UNTIL _____ C. [ ] ANNUALLY FROM _____ TO _____

4. NECESSITY FOR AID *(Continue in Block 8)*: To delineate site of underwater ...

5. GENERAL LOCALITY: Cocos Lagoon

6. CORPS OF ENGINEERS AUTHORIZED THIS STRUCTURE OR BUOY BY [ ] PERMIT OR [ ] LETTER *(file and date)*: Presently reviewing

FOR DISTRICT COMMANDERS ONLY

7. APPLICANT WILL FILL IN APPLICABLE REMAINING COLUMNS

LIGHT LIST NUMBER OR PAGE	NAME OF AID	NO. OR LTR. (7a)	LIGHT PER. (7b)	LIGHT FLASH LGTH. (7c)	LIGHT COLOR (7d)	POSITION (7e)	DEPTH OF WATER (7f)	CANDLE POWER (7g)	HT. ABOVE WATER (7h)	STRUCTURE TYPE, COLOR, AND HEIGHT ABOVE GROUND (7i)	REMARKS *(See Instructions)* (7j)
		1	--	---	---	13°15 11' 6.6"N 144°39.32'19.2"E	12'	--	4'	Inflatible, Plastic Reflective Orange, Taut - 12'	
		2	--	---	---	13°15.09' 5.4"N 144°39.31'18.6"E	12'	--	4'	SAME	
		3	--	---	---	13°15.06'3.6"N 144°39.31'18.6"E	13'	--	4'	SAME Taut - 13'	
		4	--	---	---	13°15.04'2.4"N 144°39.32'19.2"E	14'	--	4'	SAME Taut - 14'	
		5	--	---	---	13°15.03'1.8'N 144°39.34'20.4E	17'	--	4'	SAME Taut - 17'	
		6	--	---	---	13°15.06'3.6"N 144°39.35'21"E	16'		4'	SAME Taut - 16'	

8. ADDITIONAL COMMENTS

...museum which will cause navigation hazard to deep draft boats. For security & safety need to isolate site of proposed underwater shipwreck museum. Please see attached proposal and maps and drawings describing project in more detail.

9a. NAME AND ADDRESS OF PERSON IN DIRECT CHARGE OF AID
James Cruz &/or John Bent
Antiquaria, PO Box 1649
Agana, Guam 96910

9b. TELEPHONE NO.
671-477-3681

10a. NAME AND ADDRESS OF PERSON OR CORPORATION AT WHOSE EXPENSE AID IS MAINTAINED
Antiquaria
PO Box 1649
Agana, Guam 96910

10b. THE APPLICANT AGREES TO SAVE THE COAST GUARD HARMLESS WITH RESPECT TO ANY CLAIM OR CLAIMS THAT MAY RESULT ARISING FROM THE ALLEGED NEGLIGENCE OF THE MAINTENANCE OR OPERATION OF THE APPROVED AID(S).

10c. DATE: 1/9/92

10d. SIGNATURE AND TITLE OF OFFICIAL SIGNING
Jan Mansfield
Jan Mansfield, Project Engineer

FOR USE BY DISTRICT COMMANDER

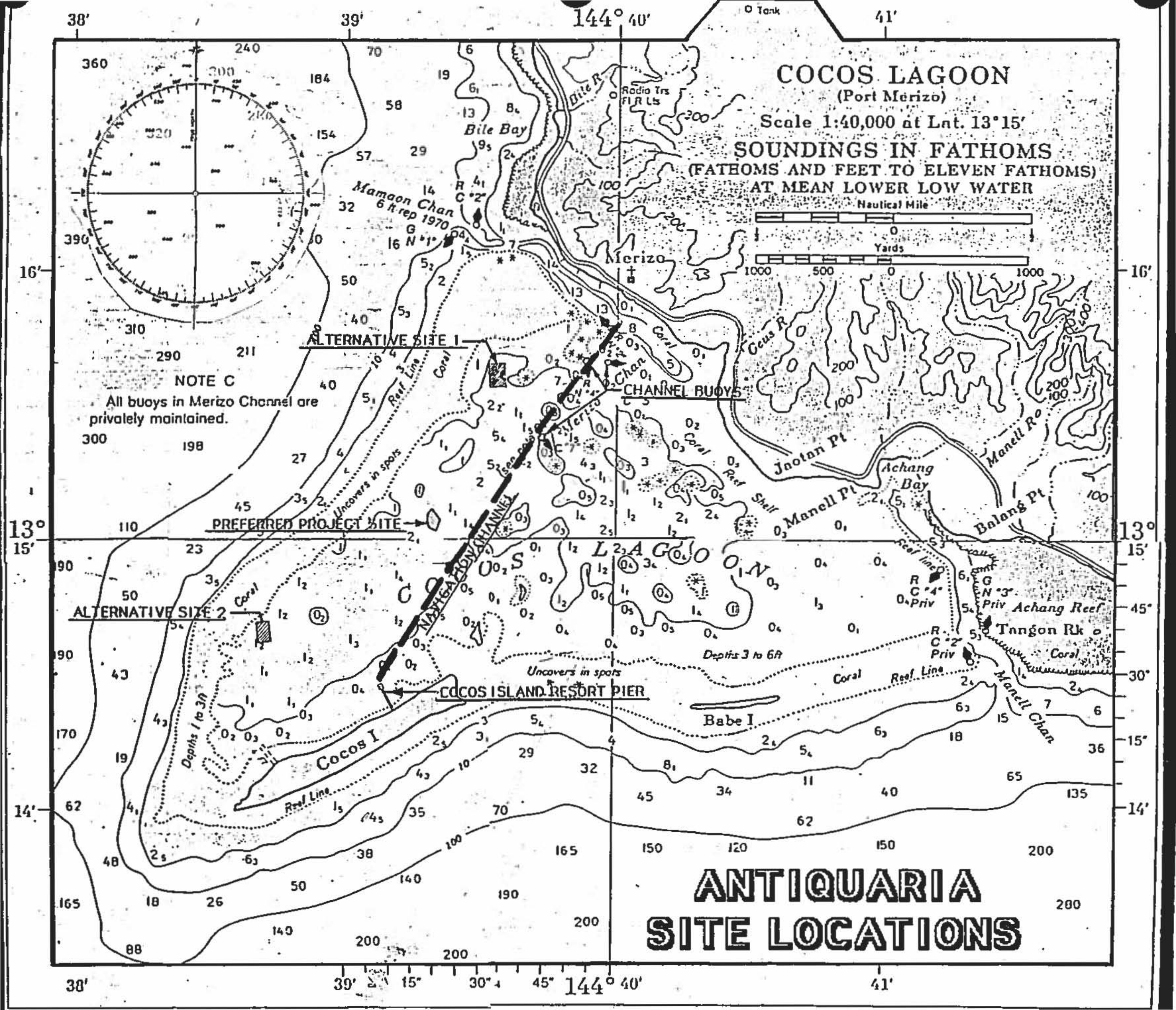
SERIAL NO.	CLASSIFICATION OF AIDS Class	RECD.		
		CHART		
		L. N. M.		

DATE APPROVED

SIGNATURE *(By direction)*

PREVIOUS EDITIONS ARE OBSOLETE

SN 7530-00-F01-1340



COCOS LAGOON
(Port Merizo)
Scale 1:40,000 at Lat. 13°15′
SOUNDINGS IN FATHOMS
(FATHOMS AND FEET TO ELEVEN FATHOMS)
AT MEAN LOWER LOW WATER
NOTE C
All buoys in Merizo Channel are privately maintained.
ALTERNATIVE SITE 1
CHANNEL BUOYS
PREFERRED PROJECT SITE
ALTERNATIVE SITE 2
COCOS ISLAND RESORT PIER
NAVIGATION CHANNEL
Merizo
Bile Bay
Mamaon Chan
Cocos I
Babe I
Achang Bay
Achang Reef
Manell Pt
Balang Pt
Manell Chan
Tangon Rk
COCOS LAGOON
ANTIQUARIA
SITE LOCATIONS