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UNITED STATES COAST GUARD

ADDRESS REPLY TO:
COMMANDER
14th COAST GUARD DISTRICT
1347 Kapiolani Blvd.
HONOLULU, HAWAII
AIRMAIL

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.N1
Serial 10148
12 February 1963

From: Commander, 14th Coast Guard District
To: Commandant (CCS)

Subj: Yap Islands site survey; preliminary data on

1. So that the Commandant will be cognizant of the general features of the Yap Islands site as soon as possible, this letter is submitted prior to the submission of the completed report.

2. The completed report will recommend a combined A-C station at Yap, making possible the disestablishment of LORSTA Ulithi. The recommended location of the station is on Gagil-Tomil Island as shown on enclosures (1) and (2). Approximately 1.1 miles of land mass intervenes between the recommended Loran-A antenna site and sea water in the direction of Guam. With high power, this should not constitute any appreciable signal loss. There will be 1.9 miles of land, 1.1 miles of sea water, and 4.8 miles of land mass before reaching the open ocean in the direction of LORSTA Palau. Attenuation due to these paths is not considered a problem for satisfactory synchronization. Enclosure (3) shows a comparison of existing versus proposed fix coverage. No fix coverage loss will result due to colocation.

3. According to Trust Territory officials the land required is available, however, purchase in fee simple is very unlikely as land ownership is closely linked to the native caste system. The land will be made available on an indefinite lease arrangement whereby the government is guaranteed use of the land as long as required. The agreement can be revoked only by the government. Land rental cost has been negotiated with the owners and has been set at $158.00 per acre, or approximately $42,900 for the 262 acres required. This is a one-time payment. It is not expected that there will be any rental cost on rights-of-way or easements for roads and the fuel oil pipe line. As shown on enclosure (2), roads in general will follow the alignment of existing or former roads and trails, all of which will require major rebuilding or at least major improvement. A new bridge will be required across the Tageren Canal on the access road from Colonia.

4. All structural and top loading element anchors for the 1350-ft. tower were flagged on the ground. It is possible that one of the top loading element anchors may require special foundation treatment as it is located on springy terrain. A test boring will be obtained at this location as well as at the tower site.

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N1
Serial 10148
12 February 1963

CCGD14 to
Commandant (ECV)

5. Fueling the station should not prove to be a difficult problem. Booster pumps will no doubt be required to overcome approximately a 100-ft. vertical lift and the friction loss in about 3.5 miles of pipe line. Anchorage for a tanker will be in protected water. A submarine pipe line approximately 3300 feet long, which is included in the total length of 3.5 miles, will be required from the shore to a dolphin at the anchorage.

6. In addition to a grounded LST at the entrance to Tomil Harbor, there is a sunken wreck at the 2½ fathom shoal location. It is reported that this wreck has moved in the past, causing a shifting of the shoal. Although the GUNNERS KNOT, a 338-ft. long vessel belonging to the Trust Territory, negotiates this entrance, it is possible that MSTS ships may refuse to enter the harbor. Accordingly, the contract surveyor has been directed to make a hydrographic survey of the entrance in order to determine the extent of any improvement work required.

7. The Yap airport is located approximately 4.7 miles south of Colonia, or about 11.5 miles from the site. When completed, the runway will be 4000 feet long. Coast Guard aviators have reported that the runway will be suitable for HC-130B operations. We propose to prove this on the return leg of the Iwo Jima electronics flight in late February. To date, both the HU-16E and C-123B aircraft have made successful landings on the runway.

8. It is expected that the completed site survey report will be mailed about the end of February, except for the detail topography and hydrography which is scheduled for completion on 31 March 1963.

/s/ George D. Synon

GEORGE D. SYNON
Chief of Staff

Encl: (1) Plot Plan, CG Dwg #14-Yap Islands-001 (3)
(2) Army Map Service, Sheet 1850 IV SE (3)
(3) Coverage Chart (3)

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UNITED STATES COAST GUARD

ADDRESS REPLY TO:
COMMANDER
14TH COAST GUARD DISTRICT
1347 Kapiolani Blvd.
HONOLULU, HAWAII

M1-1
Serial: 30004
13 February 1963

Honorable M. W. Goding
High Commissioner
Trust Territory of the Pacific Islands
Saipan, Marianas Islands

Dear Mr. Goding:

The preliminary site survey conducted on Gagil-Tomil Island has determined that a suitable location for the proposed Coast Guard Loran Transmitting Station exists on this island. In order not to delay the contracting for the design and construction of the station early assurance of the availability of the needed land is now required.

The land for the station proper (approximately 260 acres) is described as follows and is shown on the attached drawing.

> Beginning at a point, from which a U. S. Coast Guard bronze disk set in a 2-inch steel pipe and labelled C-ANT, bears 285°-05'-00" true and 2070± feet; thence 336°-55'-00" true, 1970± feet to point "B"; thence 291°-28'-00" true, 2760± feet to point "C"; thence 223°-40'-00" true, 2000± feet to point "D"; thence 141°-55'-00" true, 3970± feet to point "E"; thence 52°-00'-00" true, 2830± feet to the point of beginning comprising an area of 260 acres, more or less on Gagil-Tomil Island, Yap Islands, Trust Territory, Pacific Islands, all as shown on the attached drawing No. 14-Yap Islands-001 Rev. 0, revised 2-2-63 and entitled Yap Islands Site Survey, Plot Plan.

It will also be necessary to obtain a 300-ft square parcel of land shown on the attached drawing as a fuel farm. The exact location of the fuel farm will depend on a survey to be conducted by your office. The fuel farm area was marked on the ground by yellow flags so that the surveyor could correlate it with the land lines that may exist in this location.

In addition to the above we will require road easements connecting the station with public roads and interconnecting the station, the tank farm and the pipe line landing. We will also require pipeline easements which insofar as possible will follow the road easements. The routes will approximate those shown on the drawing but will not be firmed until further survey data is available.

C
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Y Commander, 14th Coast Guard District ltr N1-1 serial 30004 of 13 Feb 1963

Please advise me what further procedures or legal documents are required after your staff has had an opportunity to review the above.

Thank you very much for the able support your office and your field representatives have given my site survey party.

Sincerely yours,

/s/ C. C. Knapp

C. C. KNAPP
Rear Admiral, U. S. Coast Guard
Commander, Fourteenth Coast Guard District

Encl: (1) Drawing No. 14-Yap Islands-001 Rev. 0, revised 2-2-63 and entitled Yap Islands Site Survey, Plot Plan.

YAP ISLANDS LORAN SITE SURVEY

The following personnel performed this site survey during January and February 1963:

CAPT Forrest A. TINSLER (1563) USCG - Civil Engineering, 14thCGD

CDR C. W. SCHARFF (2711) USCG - Aids to Navigation, 14thCGD

Mr. Stanley Pickarski, GS-12 - Electronics Engineer, 14thCGD

Mr. Lewis Inouye, GS-11 - Structural Engineer, 14th CGD

LT Henry LOHMANN (5376) USCG - Civil Engineering, CG HQ

LT Charles W. FAIRCLOTH (5742) USCG - Civil Engineering, 14thCGD

LT Arnold SWAGERTY (5764) USCG - Electronics Engineering, CG HQ

LT John J. CLAYTON (5878) USCG - Supply Depot, 14thCGD

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TREASURY DEPARTMENT
UNITED STATES COAST GUARD

Address Reply To:
COMMANDER
14th Coast Guard District
1347 Kapiolani Boulevard
Honolulu 14, Hawaii

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N1
Serial 10197
28 February 1963

From: Commander, 14th Coast Guard District
To: Commandant (CCS)

Subj: Yap Islands Loran A-C Station Site Survey; submission of

Ref: (a) CCGD14(e) ltr N1 Ser 10148 of 12 Feb 1963

1. Reference (a) submitted preliminary data on the subject site survey, the final draft of which is forwarded under separate cover (10 copies).

2. Enclosure (1) is a copy of CCGD14 letter to the High Commissioner, Trust Territory, indicating our land requirements and requesting information on procedures required to obtain the property. A preliminary report on borings made at the proposed fuel farm indicate poor subsoil and the presence of ground water near the surface. We anticipate that this condition may dictate a relocation of the farm a short distance to the eastward. No problems are expected to develop as a result of this change. In fact, recent oral informal communication from the High Commissioner's office indicates that a move eastward may involve fewer land owners.

3. The following items have not yet been received. They will be forwarded separately:

a. Navy Oceanographic Office Chart No. 5421A.
b. Results of Laboratory Gradation and Masonry Unit Tests on rock and sand samples obtained at the Quarry at Colonia.
c. Results of borings taken on the site.
d. Topographic and Hydrographic Maps being prepared by contract surveyor.

4. Much staff work remains to be done to translate this report into design and contracting documents. However, sufficient information is now available to decide that a combined A-C station is feasible at the proposed locations, and I request that you approve this decision so planning may proceed on that basis.

/s/
C. C. KNAPP

Encl: (1) CCGD14(o) ltr N1-1 Ser 30004 of 13 Feb 1963

YAP ISLANDS

SITE SURVEY REPORT

GENERAL OPERATIONS INFORMATION

YAP ISLANDS

SITE SURVEY REPORT

GENERAL OPERATIONS INFORMATION

A. Local Name for Site:

Gagil-Tomil Island, Yap, Western Caroline Islands

1. Site Description:

Yap, in the Western Caroline Islands, lies 9° North of the equator and 3,757 miles West South West of Honolulu. It is 16 miles long and 6 miles wide, consiting of three larger islands and one smaller island separated from each other by narrow lagoons or canals. The largest island is called Yap on which the airstrip and town of Colonia are located. The Yap District Headquarters of the Trust Territory of the Pacific Islands is located in Colonia. The town is a collection of quonset huts, reconditioned pre-war concrete structures and some new concrete block buildings. East of the island of Yap and separated by the Tageren Canal is the island of Gagil-Tomil. This island is divided into the two municipalities of Tomil and Gagil. The recommended loran site is an area straddling the central section of the boundary between Tomil and Gagil.

B. Land for Site:

1. Ownership and Control:

The land for the site is privately owned by the households of 4 villages (Teb, Af, in Tomil Municipality and Maki, Gatchapar of Gagil Municipality) and various traditional controls of peoples of Thol, Deboch and Teb. Yapese custom prohibits transfer of titled land to "outsiders" but permits transfer of use rights.

2. Whose Jurisdiction and Availability:

a. Non-Private:

None

b. Private:

(1) Names, Titles and Addresses of Cognizant Officials of the Government:

Mr. M. W. GODING, High Commissioner, Trust Territory of the Pacific Islands, Saipan, M.I.

Mr. SCHOECROFT, Attorney General, Trust Territory of the Pacific Islands, Saipan, M.I.

Mr. Charles HUGHES, Attorney General's Office, Trust Territory of the Pacific Islands, Saipan, M.I.

Mr. Roy T. GALLEMORE, District Administrator, Yap District, Western Caroline Islands

(2) Availability of Site:

The relinquishment of title to land through sale is a new concept to most Micronesians and is seldom practiced. Micronesians, however, generally recognize the equity of previous title transfers and accept the need of the Government for land for official use and to care for local needs. The Administration's policy is not to purchase land, but rather to give payments for usufruct rights with residual rights vested in the original owner or to exchange land for land on an equitable basis. Chiefs that control the land have indicated that use-rights to the land will be made available. The need for eminent domain proceedings are very unlikely.

3. Description of Site:

a. General Location:

The Yap group of islands is in the western part of the Caroline Islands at 9°30' North Latitude and 138°07'.5 East Longitude, 450 miles southwest of Guam, 1,600 miles south of Tokyo and 1,150 miles east of Manila, Philippine Islands. The group comprises the individual islands of Yap, Gagil-Tomil, Map, and Rumong as well as several small islets. (The name Yap, standing alone, hereafter indicates the entire group) The loran transmitting station site is situated in the central plains area on the island of Gagil-Tomil.

b. Accessibility:

Footpaths and deteriorated, unimproved roads from smallboat landings and bombed out bridge. In some places these access ways are well used and will easily allow vehicular traffic. Surface is dirt and usually covered with grass. Where foot traffic is heavy, the grass is very short whereas on others it may be from knee to shoulder height and interwoven with ferns. The network of roads developed over 20 years ago by the Japanese were never surfaced and with few exceptions were never maintained.

c. Other Details of Interest Concerning the Site:

The site is located in the central plain section where the natives do not live or work. They do occasionally cross the area on trails leading from one village to another. According to Yapese tradition, it was in this area that the first man was born of a seven headed eel. It is also the place where the first canoe descended from heaven. Good relations with the Yapese people would be greatly enhanced if these hallowed spots were preserved. In general, the area is not used and is covered by low brush and ferns with scattered pandanus trees.

d. Describe Developments Existing or Planned Nearby. Will They Affect Loran Station Operation?

No developments and nothing planned.

C. Local Officials:

1. Involved with Construction:

Mr. Roy T. GALLEMORE, District Administrator, Yap District, Western Caroline Islands

Mr. Clarence G. PATRICK, District Public Works Officer, Yap, Western Caroline Islands

2. Persons That Should be Contacted in the Area:

Yapese: Mr. ROBEMAN, Magistrate, Tomil Municipality

Mr. THARINGON, Ranking Chief, Tomil Municipality

District Judge FANECHOOR, Magistrate of Gagil (Father-in-Law is Saipan District Administrator)

Mr. SILING, Ranking Chief, Gagil Municipality

3. Local Population:

As part of Micronesia, Yap is populated by approximately 3,000 Yapese augmented by 200-300 natives of other islands. A small colony of non-micronesians, living in Colonia, provide administrative leadership. The Yapese are dignified, sensitive people who have retained many of their old customs and beliefs. There has been less change in the Yapese culture than any other ethnic groups in Micronesia. Their stone money and style of dress - grass skirts and loin cloths - have become the best known of any of the indigenous customs of Micronesia.

D. Security:

1. Protection:

Security requirements will be a minimum. The Yapese are honest people possibly due to the severe punishment they have used in the rare cases of thievery.

2. Fencing:

Only required where it is needed to protect the public from bodily harm such as might be caused by high voltage.

3. Additional Security Measures Required:

None

4. Small Arms Allowance Required and/or Recommended:

The natives have a severe dislike of firearms. No hunting is allowed on the island and very little game available anyway. Consequently, firearms ought to be limited to the minimum required.

E. Personnel:

1. Transportation:

a. U.S. to General Locality:

Government air to Guam.

b. General Locality to Site:

Coast Guard or Trust Territory plane to Yap airfield and station vehicle to the site.

c. Personal Vehicles and Licenses:

Personal vehicles are not needed or recommended. They will be difficult to deliver to Yap but would be possible through the Pacific Micronesian Lines from Guam to Yap (Approx. $150.) Cars will require Yapese operators license and license plates. There is no charge for the operator's license, however, license plates will cost $5.00. Gasoline can be obtained from the Yap Trading Company for 55¢ per gallon.

d. Other Considerations:

There are approximately 15 miles of road on the island of Yap. No form of public transportation, including rental vehicles, is available. Bicycles and motorbikes are the most popular means of wheeled conveyance used by the various groups of people on the island of Yap.

2. Medical:

The Yap hospital is manned by native doctors and nurses, however, they will be found to have standards far below that found in Stateside hospitals. A fully equipped station sick bay is recommended with an experienced Hospital Corpsman.

a. The Yap District Hospital has a bed capacity of 57 including a special room used for surgical patients. Services are for both in-patients and outpatients with the following facilities available:

(1) X-Ray unit (No flouroscopy, no radiation therapy)

(2) Laboratory with limited equipment, restricted to the following tests:

Complete blood count
Stool examination
Culture
Sensitivity Test

(3) Operating room with facilities to perform all minor surgeries, emergency surgeries and some major surgeries. Complicated surgical procedures such as Cardiovascular, Neurological, Thoracic and Urological surgeries are not performed here.

(4) They have no facilities for E.C.G., B.M.R., nor Physiotherapy.

b. Medical:

One medical officer is always "on call" for emergencies. Emergencies are seen at any time. An ambulance is available for emergency use but the poor road conditions limit its service. Seven Health Aides are stationed in different municipalities throughout Yap and are available for treatment of minor ailments and first aid. Serious illnesses and injuries are referred to the hospital.

c. Dental:

The Dental Clinic has the following equipment:

(1) Operating Dental Chair

(2) Operating Dental Units

(3) X-Ray Units

The most prominent services which are performed in the clinic are:

(1) Fillings, all kinds

(2) Denture, all kinds

(3) Extractions

(4) Bridge work

(5) Prophylaxis

(6) Carious prevention for children

(7) Minor surgery

(8) Fracture

Services which are not available are:

(1) Orthodontic

(2) Removable bridge

(3) Root therapy

(4) Pulpectomy

(5) Complicated major surgery is usually sent to Guam.

d. Emergency:

Although there will be emergency facilities at the Yap District Hospital, it would be more desirable to air evacuate a serious case to the more adequate U. S. facilities at Guam.

3. Pay and other Records:

The facilities in Colonia would have difficulty cashing paychecks, therefore the station personnel should be paid in cash from Guam by COMARSEC. The station commanding officer should maintain the personnel and health records.

4. Dependents:

No housing is available and other facilities are extremely limited in Colonia which is the only source for such needs in Yap. Hence, this is not recommended as a dependent station.

5. Mail:

a. Service:

The Trust Territory runs a plane from Guam to Koror on a weekly schedule at present which stops on the way down on Tuesday and on the way back on Wednesday. Although a UF type plane is used now because of the necessity of water landings a larger 4 engine plane will be used when the airstrip becomes operational.

b. Official Address:

Commanding Officer
U. S. Coast Guard Loran Transmitting Station
U. S. Coast Guard Depot Box ____
Navy No. 926
c/o Fleet Post Office
San Francisco, California

6. Vehicular and Water Transportation Required:

a. General:

There is a dirt road between the airstrip and Colonia that is presently in use. Another dirt road runs north from Colonia to the Tageren Canal. The last mile or so has not been used recently and is overgrown. The bridge across the canal was destroyed during WWII and has not been replaced. The road on Gagil-Tomil Island from the Tageren Canal to the site will need complete rebuilding but does exist. Much of it has become overgrown and eroded due to lack of use and maintenance for 20 years.

A secondary road will also be desirable from the station along the general run of the pipeline, past the tank farm, to a smallboat landing opposite the fueling point. Both of these roads will have a tremendous good will effect on the local people for they will re-open the island of Gagil-Tomil to vehicular traffic. The Yapese now depend on water transportation and pedestrianism. Consideration

should be given to the possibility of making these roads public and turning them over to the Trust Territory. It is very possible, even in that event, that the Coast Guard will find it necessary to to expend funds on road maintenance. Native labor is available and the Trust Territory Administration has some road equipment. With adequate roads, and a bridge over the Tageren Canal, no water transportation will be required except what might be necessary in connection with fueling operations.

(1) Type and Number:

2 - 6 Passenger Pickup
1 - Boat Trailer
1 - 16' Outboard (Plastic)
1 - Stake Body (1½ ton) Truck, 4 wheel drive with winch

(2) Spares Required:

Standard variety for normal upkeep. If vehicles are Military type, parts should be readily available from Guam on regular logistic flights.

7. Environment:

a. Settlements Nearby:

Small native Yap villages consiting of 5 to 20 families surround the area in which the site is located. With few exceptions the houses are built of local materials. Most are constructed of three rows of heavy wooden posts set vertically in a stone platform. Stringers and cross members are lashed to the posts and a framework of bamboo for the roof is added. The roof is thatched with leaves of the nipa palm, pandanus, or coconut palm lashed onto the bamboo frame. No nails or pegs are used in construction; all pieces are lashed with cord made of coconut fiber. The stone platform may be as high as 4 feet and is made of blocks or slabs of schist or coral heads. Each house is situated in the middle of an area clean of litter and trash. Many of these areas or yards are paved with slabs of schist, and commonly the yard itself is a broad elevated rock platform. At the edges of the yard platform, placed symmetrically, are rock slabs set vertically or slanted for backrests. The sides of the house and yard platforms are used for display of the large stone discs of "Yap money". Separate from the house are one or two small thatched shelters, barely large enough for one person, where the cooking is done. It is common practice to enclose the yard with a hedge of ornamental plants to provide some privacy. Along the beaches are a few scattered thatched shelters containing bamboo racks used in drying copra. These are flimsy structures that last only three or four years.

Nearly all of the villages, especially those along the shore, have one large house - the "all men's" house - which is used only by the men and older boys as a community house. It commonly is built on a stone platform situated at the water's edge or out in

the water, and joined to the beach by a narrow stone causeway. It is similar in style to the individual houses, though generally larger and around it is displayed the village wealth of stone money.

Colonia is the main settlement of the four islands and is located on Yap Island. On H.O. Chart 5421-A and in the Sailing Directions, H.O. 82 it is erroneously referred to as Yaptown. It is the location of the Yap District Headquarters for the Trust Territory of the Pacific Islands. There is a small colony of non-micronesians consisting of approximately 12 men. Most of them are married and have their wives with them. Only small children or babies have accompanied their parents to the islands.

b. Population Types:

(1) Yapese

(2) Palauan (Small settlement)

(3) Non-Micronesian (Small settlement)

c. Language:

Yapese. Most natives can also speak Japanese. Many older Yapese speak German. Natives from other islands speak their own languages. Most natives working for the Trust Territory speak English.

8. Local Restrictions:

a. Contacts with Local Population:

Care must be exercised against trespassing; since property lines are generally unrecognizable or unapparent, use of guides for hikes should be exercised. Contacts with the local population should be guided by the comments on customs and traditions and the following personal conduct practices:

(1) Avoid rambling in the community at night. However, if there is an emergency or particular reason to be in the village, one should carry a light.

(2) Do not take, obtain or maintain any object outside the station without the consent of the proper owner.

(3) Do not trespass on an individual's land or enter in the menstrual and secret areas.

(4) Do not visit a community without a guide if you are not familiar with the community.

(5) Do not visit your Yapese friend without notification before your visit. Otherwise, you will emabarrass him because he does not want to show you his poor life. If there is no chance to send a message, stay outside the yard upon your arrival and call to your friend.

(6) Do not talk of love affairs with the opposite sex in public or in the presence of both sexes. Yapese love affairs used to be conducted in a secret manner.

(7) Taking a walk and long converstations with a member of the opposite sex is not common in the Yapese society. They are concerned that both sexes can easily get into trouble by sticking with each other.

(8) Do not praise one directly in the ways listed below, otherwise they may consider it mockery or abusive:

(a) One's beauty or handsomeness.
(b) Beauty of one's home.
(c) Beauty of one's spouse.
(d) Beauty or handsomeness of one's relative of opposite sex.
(e) Praise for food which is served.

(9) It is considered abusive to mention the name of a deceased person unless it is a necessity. You may say, "The one who had suffered" or "The one who fell into misfortune."

(10) Mentioning your mother's name or sister's name in a group of men is impolite. The Yapese may take it as a banter or jeer. If it is necessary to speak the name, the voice should be lowered and the name whispered to the interpreter or the man close by. The man near you would repeat it in higher voice or he may say "our lady", or "our mother", or "our sister".

(11) The terminology of "your sister", "your mother", "your father", "your brother" (when of the opposite sex) is abusive. It would be polite to say "our sister" or "our mother" and so on.

(12) It is an abuse to use the terminology "your wife" or "your husband" to a person older than you are. To show respect you would speak the person's name.

b. Customs and Traditions:

(1) General:

The customs of the Yapese concerning dress are different from other areas. American style clothing is usually worn by government employees and others who work or visit in the Colonia area. In most cases, however, they change to Yapese dress when they return to their village.

Children seldom wear clothes until they reach the age of one year; after that they are encouraged to wear clothing. Girls over one year of age wear grass skirts or American style dresses, depending on where they are or where they are going. Most of the girls have their heads shaved, or the hair cut very short, until they reach menstruation age, after which it is never supposed to be cut again. Some young women, however, do wear their hair cut short, but this is not according to Yapese custom.

When the girls reach womanhood (after their first menstruation) they wear a black cord, called a Marfau', around their necks when they are wearing grass skirts. This cord must be kept on at all times, especially in the presence of men. It is not absolutely necessary to wear it when only the family is present but it must never be removed in public as long as there are Yapese present.

A Yapese woman must not expose her legs above the calf, to do so would be an attempt to entice the men. Consequently, Yapese women don't wear short grass skirts or American type shorts.

Women do not walk side by side with a man when they are in a village or a public place, but follow a few paces behind. Men of the low caste (or serfs) will, however, follow a few paces behind women of a higher caste.

It is the custom for women to bathe together but they do not expose themselves to each other unnecessarily, and many times bathe in their grass skirts or lava-lavas. When wearing grass-skirts the Yapese women leave their breasts exposed.

When permission is requested to take a picture of women in Yapese dress, they usually hesitate, even though they do not mind, only pretending to dislike the idea. They usually respond to this request more readily if a copy of the picture is promised to them.

Boys at the age of one year, are taught how to wear a single-strand cloth Thu. The American counterpart of a Thu would be described as a loin cloth. As the boy grows older he may add strands, and by the time he is seventeen his Thu may consist of three or four strands, all of different colors. Red and white are the most popular colors, especially among the younger men. When a boy reaches manhood, around twenty, he may wear a gal' or kafar, in addition to his Thu. The kafar is made of dry hibiscus bark strands which pass between the thighs and are attached to the front and back of the Thu. As soon as a young man appears in his kafar he is engaged in a tussle, by some "kafared" young man to determine whether he has reached manhood and can earn the right to wear it.

In the ensuing struggle the attacked must try to keep his kafar from touching the ground and becoming soiled. He is lucky if the attacker is a close friend or relative who will pretend to put up a good fight, but will always lose. If he is among strangers, especially ones stronger than he, they will make every effort to make him lose face. When a young man loses he does not stop wearing his kafar, but he will never forget the moment, and will be ashamed whenever it is mentioned. The attack is not meant to harm, but only an attempt to get the kafar in the dirt. No young man will be accepted to a position of prestige unless he wears a kafar.

Once a person has added strands to his Thu or has worn a kafar he can never wear less strands or go without his kafar. The only time he can dress differently is in the presence of his immediate family, but never in public nor to receive guests.

(2) Various Tabcos:

It is not acceptable for a persor to step over another's basket. People carry their magic (bonod) and precious belongings in their baskets and one should never step over another's belongings. This is also true regarding people. One should never step over a person, a stretched-out leg, etc., for to do so is to liken the person to an animal.

In the men's house one should not sit on the logs that lie parallel across the house, for people who sleep in the men's house use them for pillows. It is forbidden to sit or stand on top of the stone money that stands upright; or to sit on the stones, which are around the platform of houses, which are used as back rests.

Whistling is not done in public with men, women, and children around. Whistling is meant for love and romance; when men meet their lovers in secret place. Love songs should not be sung in public in the company of men and women; they are meant for picnics when relatives get together. Husbands and wives, lovers, and friends of the same sex sing love songs together. Nowadays singing a foreign love song is not too bad, but to sing a Yapese love song among others in public is still forbidden.

Men are forbidden to enter the menstrual area, and the women to enter the men's house unless they have a vital reason.

(3) Use of Gestures:

(a) Pointing:

The Yapese point at an object or place with their index finger, as do most other people. This may be done with either a partially or fully extended arm. Pointing to an individual, especially one far distant, is considered

impolite as it may be interpreted as meaning criticism from the person doing the pointing and his companions, if any. Another means of indicating a person is to look directly at him, by wrinkling the nose in his direction, or a slight lifting of the chin in his direction.

(b) Beckoning - "Come Here":

This gesture is commonly made with the hands. After attracting the person's attention, the Yapese will motion him to "come here" either by scooping or paddling motion, and the palm may be extended up or down. The Yapese do not appreciate the American custom of whistling and beckoning with the index finger to indicate "come here". The older people feel that it is degrading to summon human beings in this manner.

(c) Gesture - To go, or keep away:

This gesture is the same as for "come here" except the motion used is horizontal rather than vertical. The index finger is used occasionally but is not easily visible to individuals any distance away. If it is desired that a person hurry, a more rapid and continuous motion is used.

(d) Gesture - Attracting a person's attention:

A Yapese attracts a person with a wink, cough, whistle, or shout commonly calling a person by name.

(e) Gesture - Go and come back, or I will be back:

If you wish to ask someone to return or indicate you will be back, the arm is extended slightly above the shoulder level and the index finger pointed in the direction the person is going, then the arm is returned to the side. This gesture is commonly used when two persons are far apart, or when you do not wish to made noise in the presence of others.

(f) Gesture for lying and cheating:

The Yapese signal with their hand to indicate to another person that a person is lying or cheating. This is done without the knowledge of the person lying or cheating. The signal is made by rotating the hand at the wrist in a rocking motion, palm down. This is not an old custom, but was begun during Japanese occupation.

(g) Gesture - Slapping a person on the back:

Slapping a person on the back or patting him on the shoulder as the Americans express friendliness is not appreciated by the Yapese. If the Yapese is not aware of your presence it is considered impolite and offensive to touch him. He may get excited, kick, shout, or flail his arms.

If you wish to attract the attention of a Yapese before getting close to him, or to enter his house or yard, a slight cough or clearing of the throat will worn that someone is near.

(i) Touching the head:

Touching a person's head is considered impolite, and is often offensive and disrespectful. Only an adult may touch the children's heads, but an adult may not touch the head of a child of a higher caste.

(j) Shaking hands:

Shaking hands is not a Yapese custom, but because this practice was started just after WWII it is now accepted by many people. They seldom grip the hand firm and strong, however, as the Americans do.

(k) Denoting respect:

When a Yapese passes in front of another person who is sitting or standing, he will bend forward slightly at the waist to denote respect. If one must pass quite closely to another person who is seated, and it will interfere with his vision, it is customary to ask him to rise before passing in front of him. The most polite gesture, however, is to walk behind the person, if possible.

(l) Burping:

Burping and hiccoughs are accepted by Yapese, and not considered impolite either in public or in the presence of company. They are considered as common as coughing.

(4) Attitude Towards Gift Giving:

When a person accepts a gift he is expected to give one in return; however, not at the time of receipt of the gifts, unless it has been prepared beforehand. A gift is usually repaid to a donor by helping him on the occasion of a feast or celebration he may be giving, by giving food or helping with the work. It is most impolite for the recipient not to repay the gift in some form. In accepting a gift one must hesitate to accept it, refusing it once or twice by saying politely that he shouldn't accept it. If the gift is still offered after two refusals it is customary to accept it with a word of thanks. This then means that the donor really wanted to give the gift and it was not just a gesture of politeness.

(5) Yapese Salutations:

The Yapese have and use very few salutations. Some of the most common are (1) Kefel (literally, correct or O.K.) a salutation of farewell, goodby or going away. (2) Ban'ene nge Falan' (literally, the object would be happy). A salutation meaning "God Bless You" in English. (3) Kegabul

(literally, it is tomorrow) A salutation meaning see you tomorrow and commonly used in the afternoon or evening. (4) Dam'od (literally, let's die) A salutation meaning goodnite usually used when going to bed. It is an old Yapese word. The reply to all the above salutations is to repeat it. (5) Mogethin (literally, say the word) This salutation is a means of asking for news or the purpose of one's visit. The reply is Dariy (literally, nothing) which is used by the Yapese even if they have something they wish to say. (6) Mog salpem (literally, say your condition) This salutation is a means of inquiring about someone's health or problems. Its English meaning is "How are You" or "What can I do for you". The replies can be Karogog (literally, about the same) Kayugurogog (literally, just about the same) or Kabfel rogog (literally, I am still fine) or Dariy (literally, nothing) if you were replying to "What can I do for you" and did not want something done. Otherwise, state what can be done for you.

9. Recreation:

a. On Station:

Recreation facilities provided on station should include a combination basketball, volleyball and tennis court as well as a ping pong table, pool table, recreational radio receivers, 16mm motion picture projection facilities, dark room, hobby shop, amateur radio station, library, and a stereo record player or tape recorder. A quarterly recreation fund allowance should be provided appropriate to the station complement.

b. Off Station:

A small community club with limited facilities is located in Colonia. Only two small beach areas are suitable for swimming, both of which are difficult to reach. Although deep sea fishing is excellent, there are no boats available suitable for operation outside of the reef. The lagoon area should provide good skin diving, spear fishing and shelling; however, fish traps should be scrupiously avoided. The area provides excellent opportunities for the photographer; however discretion must be exercised. (See paragraph E.8.) The study of Yapese culture, especially the background of stone money, may be very interesting.

c. Limitation:

The use of a small boat outside of the reef could be extremely dangerous. In case of trouble, there are no SAR facilities in the immediate area to perform rescue missions. Therefore, all boating should be limited to the large lagoon area inside the reef. See paragraphs E.8.a and E.8.b for conduct among native villages.

d. Precautions Required:

Good swimming areas clear of coral are limited even though there are many places where it will be possible and enjoyable to swim. There is no sure antidote for Stone Fish poisoning and death can follow within four hours after a strong contact. Any person swimming or wading in the rocky reef areas should wear adequate foot protection. Persons in the water should avoid touching any strange or beautiful looking fish or shells which they know nothing about. Swimmers should remain well clear of all fish traps. Hiking around the island should not be done without a guide. Close adherence to the precautions listed in paragraph E.8.a. are necessary if good public relations are to be developed.

e. Uniforms:

The standard uniform allowance is recommended with emphasis placed on tropical type clothing such as shorts and short sleeved shirts. A full station allowance of rain gear is required.

10. Health Conditions:

a. Endemic Disease:

A variety of illness is found and are listed in order of their occurrence:

Common cold - almost always present
Pulmonary Tuberculosis - very common
Intestinal parasitosis - very common
Skin diseases including leprosy, fungous infections and other are less common.

There are occasional flu epidemics, dysentary and venereal disease are not uncommon, however, tetanus is rare. The Yap Hospital has vaccines for smallpox, typhoid, tetanus and cholera although they report they do not have the actual diseases there.

b. Precautions:

Environmental sanitation is poor; however, all food establishments are cleared by the local medical department. Handlers of food for public consumption are processed thoroughly at the hospital before being certified to handle food. There are no known poisonous fruits on the island. A few plants cause skin eruptions (rash) when contacted. The best known one being the "Ivy" which causes itching and dermatitis of varying degrees. Other than the Stone Fish, mentioned in paragraph E.9.d., the only other known poisonous fish is the Tetraodon (Swell Fish) whose swelling effects develope when eaten. Certain insects and shells are very poisonous such as Cones (shells) and Scorpions. Other animals which cause some degree of toxicity include centipedes, blister bug, rats and mice although they are not fatal.

11. Local Flora and Fauna:

a. General:

The vegetation of Yap is similar in many respects to that on other high islands in this area. Mangrove swamps border much of the shoreline, generally in patches but occasionally in continuous strips. Back of the mangrove and along exposed beaches, coconut groves intermixed with forest trees occupy the coastal flats. Marshes are scattered along the coastal flat area and are planted with taro around the villages. On Yap Island both the hilltops and the valleys are blanketed by a nearly continuous growth of numerous species of broadleaf trees. The forest on Yap Island thins out southward and gives way to grass and pandanus on the low hills and farther south to dense brush. Scattered pandanus and fern is characteristic of the central part of Gagil-Tomil and parts of Map and Rumung Islands. The usual tropical fruits are grown on Yap, including Mango, Citrus, Papaya, and Banana. The fauna of Yap is typical of tropical islands with numerous species of sea birds along the coastal areas and wild pigeons are found in the interior valleys. Pigs and chickens are raised by the Yapese for food. Dogs run loose on the islands and some have become quite wild. There were no reports of their causing any problems. No other large, wild animals inhabit the islands.

b. Special Problems for Station Personnel:

Some species of the tropical forest produce fruit but as in other tropical areas these should not be eaten without first checking with the local inhabitants. One species of a broadleaf tree (Semeocarpus Venenosa Volk; Yapese "Changad") is considered poisonous in that the sap will cause severe blistering of the skin. Yap is fortunate in that it has few harmful insects, the most irritating to humans being the mosquito. Blister beetles, which cause local blistering of the skin, are present but cause little trouble. Some species of scorpions are present and should be avoided as a matter of caution.

12. Morale:

Morale on this station will be on a par with any comparable, tropical, isolated duty station. In fact, the unusual aspects of the Yapese culture will contribute a diverting environment of constant interest to station personnel. The warm and sunny climate will be conducive to outdoor activity, and there will be adequate opportunity for off-duty diversions.

13. Berthing and Messing:

Berthing and messing must be completely provided by the station. Since hotel-like accommodations in Colonia are extremely limited and crude, an allowance should be made in station design to include limited guest berthing facilities for overnite visits of inspection parties and other official visitors.

F. Logistics:

1. Transportation of General Supplies:

USCG Depot, Guam should be the transhipment point for all cargo for this station. Normal delivery of all cargo (less fuel) should be via CG Aircraft from CG Air Detachment, Guam. Materials too large or too heavy for airlifting can be shipped via Pacific Micronesian Line vessels.

a. U.S. to General Locality:

Guam is the recommended general area support point for all logistics. MATS and MSTS can be utilized to Guam.

Freight Costs to Guam: MATS, Travis to Guam - $.378 lb.
MSTS, Oakland to Guam - $1.01 per cu ft.

b. General Locality to Site:

Pacific Micronesian Lines is a private firm which operates vessels owned by the Trust Territory of the Pacific Islands. The entire size of the fleet is not known but there are four vessels presently operating between Yap and Guam. All of these vessels can be utilized in supporting the Coast Guard station at Yap. The services rendered by PML can also be used for contractor's personnel and equipment at current rates. (See attached sample rates and data on vessels)

Passenger fare from Guam to Yap is $18.04 plus $2.50 each day for meals. The trip is approximately 36 hours. No schedules are available for inclusion in this report. Present PML plans are to operate the GUNNER's KNOT and the PACIFIC ISLANDER on a 32 day schedule, i.e., every 32 days one or the other of these two ships will be leaving Guam for Yap. The MV ERROL makes the Guam to Yap run once every 6 weeks. The tanker Y-101 has no schedule.

The Trust Territory also operates an airline to Yap from Guam. Pan American Airlines currently holds the flying contract for these Trust Territory planes (UF-2G's). Present schedule is Guam-Yap every Tuesday and Yap-Guam every Wednesday. Fare is $50.00 each way. Flying time is 3½ hours. Passenger capacity is 15 persons.

Both PML and Trust Territory Airlines equipment and facilities are also available on a charter basis by interested contractors.

c. Emergency:

Coast Guard and Trust Territory planes from Guam.

d. Other Considerations:

When the airstrip is improved to the point that a C-130 can use it then shipments can be made direct from Barber's Point or via Guam.

2. Air Support:

a. Existing Airfields on or Near the Site:

(1) Name of Field:

Three sea landing lanes are presently used on Tomil Bay off Colonia. One rubber seaplane mooring buoy is available clear of shipping lanes in 18 fathoms of water. An airstrip is being built on the Island of Yap, 4½ miles southwest of Colonia. It is owned and operated by the Trust Territory. The airstrip was originally a well developed, Japanese field during WWII. The wrecks of nineteen old Japanese planes are still to be found in the brush around the strip. Rehabilitation was started in 1958.

(2) Runway Description:

The strip will eventually be 4,800 feet by 300 feet. At present the center strip is 3,300 feet by 200 feet. It is made of crushed and compacted coral, 18 inches to 3 feet deep. At present no further surfacing is planned except for 4 inches of a better grade of coral. The balance of 1,500 feet and 50 feet on the sides has been graded but not covered with coral.

(3) Hangars and Repair Facilities Available:

None exist and none planned at present.

(4) Fuel Facilities:

Presently consists of drums and hand pump that must be hauled to the field by truck on order. A 1,200 gallon tank with electrical driven pump is on order. The installation date is pending delivery of material (3-18 months). No plans for jet fuel at this time.

(5) Crash and Fire Fighting Facilities Available:

A dry chemical unit has been recently received, mounted on a jeep. As of 20 January 1963, there were no experienced or trained operators. An instructor was expected to visit the island to train people in its use.

(6) Night Operation Lighting:

None. No plans at this time.

(7) Navigational Aids:

Radiobeacon service can be obtained from the communications station located in Colonia 4½ miles from the airstrip. A windsock is displayed at the field.

(8) Present Operations on the Field:

(a) Type of Operation:

None to date. Weekly Trust Territory plane (UF) lands in Tomil Harbor. The first landing on the new airstrip was by CG UF plane on 13 January 1963. It was considered by the local people a historic event causing all hands to turn out. A second landing by CG UF was made 19 January 1963.

(b) Type of Aircraft Using the Field:

Only CG UF's have used the field to date. The Trust Territory expects to operate their DC5 into this field. A CG C-123 could also use the field.

(9) Weather Forecasting Facilities:

There are no weather forecasting facilities at the field. A Weather Bureau Observation Station has been established in Colonia from which existing weather conditions can be obtained. This station makes hourly weather observations with upper air observations every twelve hours.

(10) Control Tower:

A small terminal building is planned that may have a tower probably manned only on demand; however, no plans or building specifications were available to ascertain future developments.

(11) Access to the Field:

(a) Roads:

A dirt road runs from Colonia to the field. It will eventually be surfaced with coral after the field is finished. Most of the road is of two lane width.

(b) Buses and Railroads:

None

(12) Suitability of the Field for UF Operations:

(a) Is the Airstrip Needed for Support?

Yes

1. Explain:

Regular periodic logistic flights will be required for support of the station.

(13) Clearances:

Obtained from Yap District Administrator, Trust Territory of the Pacific Islands through his communications station at Yap.

(14) Maintenance Aspects:

If the Trust Territory Administration is unable to complete and maintain the field it may be necessary for the Coast Guard to do so to eliminate the logistic restrictions and added difficulties involved in water landings. The local District Administrator has been furnished limited funds, personnel and equipment to rehabilitate the field to the present extent and consequently it has taken considerable time. The future outlook for improvement of these conditions, as far as his staff are concerned, was not encouraging.

3. Communications:

This station should be provided with the standard communications equipment designed for a similar Loran A-C station. Air/ground and ship/shore frequency capability will be required. Special SAR frequency capability is not considered necessary. A telephone line linking the loran station with the Trust Territory radio station in Colonia is recommended. An additional telephone connection to the District Administrator's Office is desirable. The loran station should be outfitted with amateur radio equipment.

4. Food:

With the exception of locally grown tropical fruits, there is no local source of food and provisions. All foodstuffs will have to be imported by air or surface support units. A one month cold storage capacity is considered adequate for the station. Trust Territory regulations restrict importation of any fresh produce that has not been properly sprayed and stamped approved by appropriate agricultural inspection as set forth in the Trust Territory of the Pacific Islands Code, Sections 730 through 739 "Plant and Animal Quarantine Laws".

G. Meteorological:

1. Climate:

a. General:

Climatological summaries are attached to this report. The data supplied is from the Weather Bureau Office, located approximately 3¼ miles southwest of the proposed Yap Loran Station Site. Data taken from this observatory, is considered to be representative of the weather conditions at the proposed site.

b. Temperature: (See attached climatological data)

Temperatures vary only slightly throughout the year and from one year to another. From month to month the mean temperature variation is only 1° F., and the range between the mean daily maximum and the mean daily minimum is only 13° F. The extreme range, from highest to lowest temperatures ever recorded, is 31° F. (from a high of 98° to a low of 67°) and both temperatures observed during April.

c. Relative Humidity: (See attached climatological data)

The humidity at Yap is high throughout the year, both day and night. Values is excess of 90% and often as high as 100% are commonplace at night. This high humidity results in corrosion and wood-rot, and can cause serious maintenance problems. These problems are magnified by the effects of accumulation of salt particles, which are deposited not only along the coasts but also in lesser concentrations upon interior locations - lowlands and on hilltops alike.

d. Precipitation: (See attached climatological data)

The highest annual rainfall on record is 152.0 inches; the lowest 72.9. Fluctuations from year to year in the monthly amounts, especially during the tradewind season, are very apt to include very dry periods. February - April is the most critical period for these dry points. In each of these three months there has been as little as one inch of precipitation. During the seven years from 1948 through 1955, the monthly rainfall was less than 3 inches; twice during February, three times during March, and once during April. In 1954 these very low amounts were successive, extending from February through April and included January with only 2.97 inches. As 3 inches of rain is an inadequate monthly amount for water supply, it is evident that "droughts" are common during February - April. On the other hand, monthly rainfall amounts may be far above average, as monthly totals have exceeded 12 inches in every month of the dry tradewind season.

e. Surface Winds: (See attached climatological data)

Winds tabulated in the climatological summary are less than those normally observed in the open lagoon area. Winds of sufficient strength to hamper small boat operations and other kinds of outdoor activities are common only during the tradewind season when velocities in excess of 17 knots occur over 15% of the time.

f. Mean Cloud Cover: (See attached climatological data)

Mean cloud cover is expressed as a percentage and represents the average amount of sky that is covered by clouds. Cloud cover at all levels is considered in the computation. Figures are for sunrise to sunset only, as there is no data on night observations.

g. Visibility:

Fog is almost non-existent at Yap, there being no periods of heavy fog during the past 13 years. Visibility is normally high except during periods of heavy rainfall. During the mid-evening and early morning showers, the visibility is seldom less than 10 miles.

h. Typhoons: (See attached climatological data)

The tabulation is of the number of typhoons, maximum winds equal to or greater than 65 knots, and tropical storms, maximum winds less than 65 knots, whose center passed within 120 miles of Yap during a 20 year period. Three important generalizations regarding the influence of typhoons and other intense tropical storms upon Yap are: (1) very high winds, in excess of 60 knots, will nearly always result when the typhoon center passes within 50 miles to the north or 100 miles to the south; (2) a typhoon will usually produce very intense rains even though it is centered at distances of 120 to 200 miles; (3) to bring severe inundation to Yap, a typhoon must hit the island or must pass within a distance of 25 to 50 miles to the south.

2. Availability of Weather Forecasts and Warning Service:

Weather forecasts and warnings are available from Fleet Weather Central, Guam, M.I., located approximately 450 miles northeast of Yap. The local observatory cannot forecast but will relay and supply information on existing conditions.

3. Special Considerations:

a. Local Land Conditions:

Yap is almost flat for meteorological considerations. Neither the land nor the vegetation produce any unusual effect in wind direction or other climotological phenomenon. Hills are low and gently rounded and create rainfall variations of no more than 7% or 8%.

b. Harbor Facilities Affected by the Weather:

Tomil Harbor is the only harbor at Yap and is located on the southeastern side of the island. It is protected from the prevailing winds from east to northeast during November to June and from southwest to west during July to September. The force of swells is normally spent on the shallow reef to the south-southeast. Adverse effects in the harbor are felt during tropical storms or typhoon weather from the south with waves and swells causing a surge of water inward across the reef, flooding coastal areas.

c. Severe Conditions:

Severe conditions occur only when a typhoon or tropical storm passes nearby (see 1.d. above). Yap is on the edge of the typhoon belt, with the average path of typhoon centers passing to the north. It is estimated that severe inundations along the coast will occur probably 3 times in 20 years.

d. Unusual Conditions Prevailing:

None.

H. Oceanography:

1. Tide:

The mean high water interval at Tomil Harbor is $7^h\ 15^m$. Mean tide range is 3 feet with a spring tide range of 3.9 feet.

2. Current:

The chart shows a current of 1½ knots ebb and one knot flood in the harbor. At Tomil Harbor entrance there is a westerly cross current which is strongest during northeasterly winds. Accordingly, vessels should favor the east side of the channel.

3. Seasonal Changes:

There are no appreciable season changes. During July through September the light variable surface winds should result in generally calm conditions except for choppy seas during squalls. During the remainder of the year, prevailing winds maintain a swell of about 4 feet in height and 150 feet in length in the open sea.

4. Shore Conditions:

The four, nearly united islands of Yap are within a common coral reef. The lagoon area between reef and shore line varies from 400 yards to 2 miles. Generally, the lagoon ranges from 1 to 6 feet in depth. Wave action in the lagoon is negligible due to a shallow reef where swells break. Several narrow breaks in the reef afford access to the lagoon by small vessels. These entrances are generally narrow and deep. In the lagoon area there are numerous stone fish traps constructed by native fishermen that endanger smallboat operation. The shoreline proper is mostly mangrove swamp with occasional rocky areas. There are two small sand beaches inaccessible by roads.

5. Offshore Conditions:

Outside the reef, open sea conditions prevail. Tomil Harbor is the only deepwater harbor available. The other deepwater openings in the reefline are not considered economically feasible for development as a harbor or beach landing.

I. Hydrography:

1. General:

Hydrographic information available from Sailing Directions, H.O. 82, and Oceanographic Office charts is considered generally adequate. A careful bottom survey off the proposed harbor fueling facility and harbor entrance will be necessary.

2. Anchorages:

Adequate deepwater (90'-120') with mud bottom within Tomil Harbor afford good anchorages. No mooring buoys have been established except for one aircraft mooring buoy not shown on H.O. Chart 5421-A. Anchorage information given in Sailing Directions, H.O. 82, is adequate.

3. Approaches:

The approach to Tomil Harbor must be made with extreme caution. An abandoned LST is stranded on the western reef of the entrance. There is a sunken wreck inshore of the LST near the west side of the channel. A shoal area has built up between the LST and sunken wreck making it dufficult for smaller cargo type vessels to enter the harbor. Larger vessels should not attempt to enter under present conditions. A detailed survey of the entrance should be made to ascertain the extent of work required to provide sufficient access to deepdraft vessels.

4. Charts Available:

H.O. 5421-D, Yap Islands
H.O. 5421-A, Tomil Harbor and Approaches

These are considered adequate subject to the restrictions outlined in the preceding paragraph.

5. Boat Landings:

No smallboat landings have been developed except those at Colonia which are in advanced state of deterioration. LCVP's and LCM's are best suited for beaching and landings on Gagil-Tomil; however, much of the waters adjacent to suitable landing areas are very shoal and can only be navigated during high tide.

6. Dock Facilities:

There is a dock suitable for one FS type vessel; however, it usually requires the vessel to set on the mud bottom at low tide. The turning basin off the end of the dock is large enough for an FS to turn and come alongside unaided. The dock is constructed of sheet steel pilings forming an "L", 200 feet by 60 feet behind which is a graded fill of dredgings from the coral reef and channel. There are two warehouses in the dock area; one belonging to the Yap Trading Company, and the other to the Yap District Trust Territory. Small boats normally tie up at a small pier, badly deteriorated, on the south side of the peninsula between the dock and the Yap District Hospital.

K. Recommended Station Complement: (Loran A-C Station)

1. Officers:

LT - 1

RELE - 1*

2. Enlisted:

BMC - 1

SN - 6

HM1 - 1

CS1 - 1

CS3 - 1

ETC - 1

ET1 - 2

ET2 - 3

ET3 - 4

RM2 - 1*

ENC - 1

EN1 - 1

EN2 - 1

EN3 - 1

FN - 2

DC1 - 1

EM1 - 1

29

3. Indigenous:

Maintenance Handyman - 3

Cooks Helper - 1

4

* This billet can be deleted after the first year of station operation.

J. General Comments and Recommendations:

1. Logistics:

a. General:

The following table lists the sources of various items:

Requirement	Guam	Yap
Air Support Visit	CGAIRDET	- -
Surface Support	Transit CG Vessel or PML	- -
Personnel	COMARSEC	- -
Commissary	NSD	Yap Trading Co.
GSK	NSD	- -
Electronics	NSD or CG	- -
Misc parts & CG peculiar	COMARSEC & CCGD14	- -
Fuel	JSPA (or PML)	- -
Small Stores	NSD	- -
Medical Stores	NSD	- -
Movies	NAVSTA Guam	- -
Exchange Store	NAVSTA Guam	- -
Pay	COMARSEC (Dollars)	- -
Mail	FPO	- -
Morale	COMARSEC	- -
Emergency Air Evacuation	CGAIRDET	TT Plane
Medical Relief	Naval Hosp. Guam	TT Hospital

Guam is the only general area support point available. There are no alternates. The foregoing table indicates the availability of some services at Yap. These services are extremely limited. The Yap Trading Company located in Colonia is a self-supporting venture administered by the Trust Territory. The commissary store handles foodstuffs for the convenience of Yap residents. Occasional purchases by Coast Guard personnel will be welcomed but the store cannot be considered a major support point. The Yap Trading Company also operates a general store in Colonia where bicycles, motorbikes, accessories and parts, hardware items and household goods are carried. At both stores the cost is approximately 50% higher than USN stores on Guam.

The Trust Territory facilities located at Yap (Colonia) include:

Crane Service (Capacity 5,000 lbs)
Vehicle Repair Shop (Sparse spare parts)
Carpenter Shop
Plumbing Shop
Machine Shop
Electrical Shop
Boat Service (LCM, 26 ft and 18 ft boats)

Trust Territory officials contacted agreed that a cross-servicing agreement can be made by correspondence with the High Commissioner's Office on Saipan. The Trust Territory Comptroller is located on Saipan and the local Finance Officer has no authority to enter into such an agreement. Use of Trust Territory facilities by the Site Survey Party was made with verbal approval of the High Commissioner.

b. Additional Contract Information:

It is the opinion of the Trust Territory Officials at Yap that there will be some local labor available to Government Contractors at Yap. Generally, unskilled labor will be abundant and skilled men scarce. Current rates paid by Trust Territory at Yap are attached. Trust Territory officials have also indicated that their limited equipment and facilities will be made available for hire subject, of course, to the needs of the Trust Territory.

c. Construction Staging Arrangements: (Coast Guard use)

(1) Verbal arrangements have been made for the following:

(a) U. S. Navy Stock items will be procured from USNSD, Guam as much as possible. A letter requesting the availability of certain stock items should be sent to Commanding Officer, U. S. Naval Supply Depot, Guam, Attention: Control Department (Code 900). The items will be checked as to availability and returned to CCGD14(f). Copies should be sent to COMARSEC and the original letter should be hand carried to NSD Guam by the Supply Officer of MARSEC.

(b) The items procured will be packed, crated and stored at NSD, Guam. Tentative arrangements have been made for 3,000 - 4,000 square feet of storage space at NSD, Guam, for the period November 1963 through June 1964. These services must be requested in writing to Commanding Officer, U. S. Naval Supply Depot, Guam, Attention: Mrs. Ruth Gillis, Planning Department. A completed DD-1144 (Cross-Servicing Agreement) should accompany the letter request.

(2) The preceding arrangements were made by the Logistics Officer of the Site Survey Team in company with a supply representative of Commander, Marianas Section. COMARSEC must be kept aware of all details concerning these services since they will be responsible for receiving, storing and shipping all Coast Guard material for the station construction.

2. Fueling:

Fuel necessary to operate this station is available from the Joint Services Petroleum Agency, Guam Sub-Area Office, U. S. Naval Fuel Depot, Guam. Estimated usage is 700,000 gallons per year.

a. Transportation of Fuel from Guam to Yap:

A visit was made to the Guam Sub-Area Petroleum Office on 31 January 1963 to inquire into the availability of fuel and transportation of fuel to Yap. As stated above, the fuel is and will be available, however, neither the U. S. Navy or MSTS at Guam have the capabilities to deliver to Yap. Further inquiries regarding delivery of fuel by Navy or MSTS are being made in Honolulu. Current fuel price at Guam is $.087 per gallon. Suggested method of fuel delivery at this time is by Pacific Micronesian Lines. A visit to PML was made on 31 January 1963 and a conference held with Mr. D. BUSH, General NIGO and CAPT W. KERR, Port Captain, regarding this problem. It is their opinion that PML can fuel and re-fuel the station at Yap, however, since PML is an arm of the Trust Territory, a formal inquiry must be made to the Trust Territory High Commissioner.

3. Water Supply:

No acceptable surface water supply is readily available. With the high annual rainfall Yap receives, a catchment system should be considered. Adequate storage is necessary to carry the station over the occasional lower than normal dry season. In general, the term "dry season" in Yap is more relative than factual. In the climate experienced at Yap, water consumption can be expected to be high for normal health and comfort.

4. Graves and Monuments:

Cemeteries are located near the villages generally on a prominent ridgetop or hill. The graves are rectangular pyramids built up in two or more steps. The sides of each step are made of stones collected locally, and the inside is filled with soil. Many are decorated with beer bottles stuck neck down into the soil. The size of the graves vary from a few feet on each side for small children, to 20 feet by 10 feet and up to 6 feet high for men of high social standing. (See paragraph A.3.c. for additional information) Yapese natives, working for the siting party, indicated that large mounds in the vicinity of the southerly tower anchors were caused by mass burials of Japanese soldiers during WWII. They are not marked in any way.

5. Station Landscaping:

The selected station site is void of shade trees and other beneficial or attractive vegetation. The appearance and tropical environment of the station could be considerably improved by planting coconut seedlings and other appropriate growth as a final touch to the clean-up and landscaping provided by the contractor. With proper care and attention, any beneficial vegetation introduced to the site will probably grow reasonably well. One reason why there is probably an absence of tree growth now is that it has never been introduced, either naturally or by man, and provided favorable growth conditions. There is considerable growth of the bush, called Sakaki, by the Japanese. This bush probably was introduced by the Japanese during their occupancy of Yap.

6. Colocation of the LORSTA Ulithi Rate:

It is recommended that a Loran-A, high power, double pulse, master station be established at Yap and that LORSTA Ulithi be disestablished as discussed in detail in the Electronics portion of this report. There is adequate space for the required Loran-A antennas and, by using high power, slightly better coverage will be provided over that now available from Ulithi.

Most important aspects of colocation are the reduction in personnel requirements and economics in station maintenance. Except for the signal power building at Ulithi, all buildings are WWII quonsets which are well past their useful life. Rehabilitation will cost $135,000 for material alone. The airstrip has been a marginal one since the station was built and since the typhoon of December 1960 the conditions have been very critical. Space does not exist for extension of the strip as required to provide for safe operation.

7. System Monitor:

It is recommended that the System Monitor for the Iwo Jima-Yap-Marcus legs be located at Depot Guam. By combining this function with the Section Radio Station and possibly Cocos Island Loran-A, more economical employment of assigned ET's can be realized. No compatibility problems are expected.

8. Navigating Tomil Harbor Entrance:

In a discussion on 10 February 1963 with CAPT O'NIEL of the Trust Territory WAK vessel, the GUNNER's KNOT, the following information was obtained. When entering Tomil Harbor, stay on course 315°T, passing Tomil Harbor Entrance Buoy 2 close by to starboard. He normally requests DISTAD Yap to place his LCM over the shoal near Beacon No. 3 as an aid in estimating his distance from the shoal. CAPT O'NIEL recommends entering the harbor after 1000 as shoal areas and the reefs are then easily observed. He also advises that polaroid sun glasses are helpful in spotting shoal waters.

SAMPLE RATES

Pacific Micronesian Line, Inc. Trust Territory Freight Tariff No. 1-D

No.	Item	Rate Basis	Group I Rates
1.	Automotive vehicles	- - -	$100 - $250
2.	Beverages, non-alcoholic	W/M	16.50
3.	Boats, up to 25 feet in crates or cradles	W/M	12.00
4.	Cannded goods	W/M	15.50
5.	Cement (sacks)	W	16.00
6.	Cigarettes	W	27.00
7.	Drugs (serums, vaccines etc. not refrigerated)	W/M	46.00
8.	Fruits and vegetables	W	20.00
9.	Household goods and personal effects	W/M	19.50
10.	Iron and steel articles	W/M	12.50
11.	Lumber	MBM	19.50
12.	Mail	lb. Net	.036
13.	Milk	W	15.50
14.	Parcels and packages over 50 lbs/Per pkg. (over 5 cu ft or $25. not accepted)		5.00
15.	Plywood	W/M	19.50
16.	Refrigerated cargo:		
	Drugs	W/M	65.00
	Fruits and vegetables, frozen	W/M	32.50
	Meats	W	46.00
17.	Valuable cargo (Furs, jewelry, fountain pens, precious metal)	AD VAL	1½ %

PACIFIC MICRONESIAN LINES, INC., VESSEL SPECIFICATIONS

	MS GUNNER's KNOT & MS PACIFIC ISLANDER	MV ERROL	MV Y-101
Type	Single screw (CL-M-AV1) Diesel Freighter	Twin screws(F.S.) Steel Supply Vessel	Twin Screws Tank Ship
Built	1945	1944	1944
Classification	American Bureau+A1(E)+AMS+RMC+ EAC	A-1 American Bureau	A-1 American Bureau
Speed - normal	10.5	10	7.5
Fuel Type	Diesel Oil	Diesel Oil	Diesel Oil
Fuel Consumption per day	51 bbls. steaming 8 bbls. in port working	1,000 gal. steaming 20 gal. in port work	600 gal.
Fuel Capacity	6,516 bbls. 98% full	20,000 gal.	5,500 barrels
F.W. Capacity	173.3 tons	20,000 gal.	- - -
F.W. Consumption	5 tons per day	1,000 gal.per day	- - -
Length O.A.	338' 8¾"	176' 11"	182' 6"
Length B.P.	320' 0"	164' 11½"	179' 4"
Breadth Molded	50' 0"	32' 0"	30' 0"
Depth Molded	29' ¾"	14' 3 7/8"	13' 6"
Gears Tonnage	3,812.54	558	632.94
Net Tonnage	2,132	248	334

CLIMATOLOGICAL DATA - YAP ISLANDS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	A**
Temperature (°F)														
Absolute maximum	90	92	90	98	93	94	96	93	93	93	93	94	98	13
Mean daily maximum	85.4	85.7	86.3	87.6	87.7	87.8	87.6	87.4	87.8	87.8	87.1	85.9	87.0	B
Mean	80.8	80.7	81.3	82.3	82.3	82.1	81.7	81.6	81.8	81.9	81.8	81.2	81.6	B
Mean daily minimum	76.1	75.7	76.4	77.0	76.9	76.4	75.5	75.7	75.7	75.9	76.5	76.4	76.2	B
Absolute minimum	70	71	71	67	70	70	70	70	69	70	69	71	67	13
Mean Relative Humid.(%)														
0300 LST	87	85	86	86	88	90	91	91	91	92	90	88	89	12
1500 LST	77	75	75	75	77	77	77	79	79	80	79	79	77	13
Precipitation														
Normal total	6.83	4.93	4.71	5.75	9.15	10.39	16.60	15.93	14.16	12.82	10.72	10.15	122.14	B
Max. 24 hr precip. (inches)	10.45	3.98	4.52	5.27	3.50	6.28	4.93	6.33	5.87	5.32	8.91	5.05	10.45	13
Mean no. days with precip.(.04" or more)	20	16	16	18	22	23	25	23	22	23	22	22	252	18
Surface Winds														
Prevail wind direct.	NE	NE	NE	NE	NE	E	E	SW	SW	W	NE	NE	NE	2
Mean speed (knots)	9.0	8.1	8.0	7.5	7.4	5.6	5.0	5.3	6.0	5.9	6.4	9.1	6.9	2
Max. speed (knots)	32	33	50	26	27	33	28	23	31	34	72	72	72	2
Mean Cloud Cover (%)	72	71	70	68	71	75	79	81	78	75	73	75	74	19
Storms Passing Within 120 Nautical Miles													Totals for	
Typhoons	3	1	1	1	3	2	3	1	0	1	11	6	33	a 20 year
Tropical Storms	2	1	0	1	4	0	0	2	1	1	3	0	15	period
Mean No. of Days With Thunder Storms	less than ½	less than ½	1	1	1	2	1	2	4	2	2	1	17	16

** A - Length of record years. B - 1921 - 1950 data.

TRUST TERRITORY OF THE PACIFIC ISLANDS

TITLE AND PAY PLAN - HOURLY PAY RANGE

Position Title	Pay Grade	Position Title	Pay Grade
Blaster and Driller	A-5	Mechanic	A-5
Boat Operator	A-6	Mechanic Jr.	A-4
Carpenter	A-5	Mechanic Helper	A-2
Carpenter Jr.	A-4	Painter	A-4
Carpenter Helper	A-2	Painter Jr.	A-3
Cook Sr.	A-5	Painter Helper	A-2
Deckhand	A-2	Plumber	A-5
Electrician	A-5	Plumber Jr.	A-4
Electrician Jr.	A-4	Plumber Helper	A-2
Electrician Helper	A-2	Rigger	A-5
Heavy Equipment Operator	A-5	Truck Driver	A-3
Laborer	A-2	Truck Driver Heavy Trailer	A-5
Laborer Heavy	A-3	Watchman	A-3
Machinist	A-5	Welder	A-5
Machinist Jr.	A-4	Welder Jr.	A-4
Machinest Helper	A-2	Welder Helper	A-2
Cement Finisher	A-5	Foreman (All Trades)	A-7
Cement Finisher Jr.	A-4	Superintendent (All Trades)	A-8
Cement Finisher Helper	A-2		

IF TRUST TERRITORY MAINTAINS TIME, ATTENDANCE AND PAYROLLS
ADD 20% TO BASE PAY

PAY GRADE	A	B	C
A-1	.25	.27	.29
A-2	.27	.29	.31
A-3	.29	.31	.33
A-4	.32	.35	.38
A-5	.37	.42	.46
A-6	.45	.50	.55
A-7	.54	.59	.64
A-8	.64	.69	.74

ALL TIME OVER 8 HOURS PER DAY IS TIME AND ONE-HALF - HOLIDAY PAY
IS DOUBLE TIME

YAP ISLANDS

SITE SURVEY REPORT

ELECTRONICS ENGINEERING REPORT

YAP ISLANDS

ELECTRONICS SITE SURVEY REPORT

A. PAIRED STATIONS

1. GAGIL-TOMIL Island of the YAP ISLANDS group, CAROLINE ISLANDS, is proposed as the location for Whiskey slave of the Northwest Pacific Loran C Chain, operating with IWO JIMA as master.

2. Distances and Great Circle Bearings from YAP to the associated system units are as follows:

To	Distance N.M.	GCB
a. Master, IWO JIMA	935	11°
b. SAM, OSHIMA, JAPAN	1510	3°
c. SAM (Proposed), GUAM	445	59°

3. Tabulated distances and bearings are diagrammed in enclosure (1).

B. CALCULATED SIGNAL STRENGTHS

1. The calculated ground wave field intensity at YAP from IWO JIMA master, based on a sampling point power of 750KW radiated from IWO JIMA, and a sea water path of 935 N.M., is 52 db above 1 uv/m, or 398 uv/m.

2. Assuming normal reciprocity of the transmission path and 750KW radiated from YAP, a signal field of 52 db above 1 uv/m would also obtain at IWO JIMA.

3. The field intensity at the designated System Area Monitor, OSHIMA, JAPAN, based on 750KW radiated from YAP, and an overwater path of 1510 N.M. is 30.75 db above 1 uv/m, or 35 uv/m.

4. Assuming the requirement for a secondary area monitor to monitor the M-W leg of this Chain, located at GUAM, the field intensity expected at GUAM from YAP, for 750KW radiated and an overwater path of 450 N.M., is 72 db above 1 uv/m, or 4000 uv/m.

C. SIGNAL TO NOISE RATIOS

1. A plot of predicted 100 kc/s band noise levels for four hour time blocks, covering all seasons of the year, and corrected for 25 kc/s receiver bandwidth, is attached as enclosure (2). Information is based on CCIR report #65. The predicted annual median noise is 38 db above 1 uv/m (80 uv/m).

2. Compensating for probable variations from the predicted median noise within the four hour time blocks for all seasons of the year, it is expected that a noise level of 58 db above 1 uv/m (795 uv/m) will be exceeded only 5% of the time over the entire year. The probability curve is attached as enclosure (3).

3. AN/URM-6 (NM-10) field intensity meter 100 kc/s noise measurements were made using the type UG-204/U vertical antenna. Data, corrected for 25 kc/s bandwidth (indicated F.I. plus 20 log $\sqrt{\frac{25}{0.6}}$) is plotted to the same scale as predicted noise on the noise plot of enclosure (1). Measurements were made on 17 and 18 January 1963 at the U. S. Weather Bureau station on YAP Island, approximately 3 miles from the proposed loran station site on GAGIL-TOMIL. Correlation of measured/predicted 100 kc/s noise is considered good.

4. Based on the 58 db, 95% reliability index, and a ground wave field intensity of 52 db from IWO JIMA, the "95% reliability of reception index" S/N ratio for synchronization at YAP will be 1 to 2.

5. The computed S/N ratio at IWO JIMA from YAP, based on the IWO JIMA 95% reliability noise figure of 57 db, will be 1 to 1.8.

6. At SAM, OSHIMA, JAPAN, for a local 95% noise index of 55 db (562 uv/m), the S/N ratio from YAP will be 1 to 16.

7. At monitor GUAM, for a 95% noise figure of 57 db above 1 uv/m (708 uv/m) the computed S/N ratio from YAP is 6 to 1.

D. PROPAGATION CONSIDERATIONS

1. The proposed site is approximately centered on GAGIL-TOMIL and is located in the only available level area in the YAP ISLANDS, on a plain at an average elevation of approximately 100 feet above sea level. Surrounding terrain is gently rolling. The antenna ground plane area, planned for 3000' diameter, is essentially flat, well within 10% grade limits except for fringe areas along the southwestern peripheral boundary where contours dip quite rapidly to a swampy stream bed. Tower and structural guy anchor locations, however, are all on firm, high ground except for one anchor location which may require a special foundation.

2. The area is generally free of vegetation except for a ground cover, waist high, of "sword edge" ferns and occasional pandanus trees. Dense vegetation is found in the marshy areas along the stream beds.

3. Approximately 4.25 N.M. of GAGIL-TOMIL Island lies along the baseline to IWO JIMA. The maximum overland path, directly North, is approximately 6 N.M. long (GAGIL-TOMIL and RUMUNG ISLANDS) with maximum elevations of 180 feet above sea level. Maximum elevation in the YAP Islands (on YAP Island), southwest of the proposed site, is 570 feet above sea level. In view of the relatively low elevations and short

overland paths involved, the entire YAP Islands land mass is believed to be minor for propagation considerations. Unobstructed overwater take-off is afforded to the entire service area on this basis.

E. INTERFERENCE CONSIDERATIONS

1. A portable power supply was unavailable for on-site GAGIL-TOMIL noise and interference measurements. The rf spectrum through the range of 16-260 kc/s was monitored, however, at the U. S. Weather Bureau Station on YAP Island, approximately 3 miles from the proposed site, using the AN/URM-6 test set. Measurements are considered valid and representative of conditions prevailing at the site. Results of measurements are tabulated in enclosure (4).

2. No frequency products were detected which were considered a potentially serious interference source to Loran operation. A Japanese CW station (JMC) was heard on 90.5 kc/s with a signal of 13 db above 1 uv/m, and RATT on 127.5 kc/s at 16 db above 1 uv/m. No other signals in the band of 90-110 kc/s were observed.

3. The nearest electronic-communications installation is the Trust Territory Communications Station on YAP Island, 3 miles distant. Installed equipment consists of:

a.	1 ea. BC-339	1 KW, A-1
b.	1 ea. BC-610	400W A-1, 300W A-3
c.	1 ea. TAJ-19	300W A-1
d.	1 ea. TBL-11	200W A-1, 50W A-3
e.	2 ea. TCK-4	600W A-1, 400W A-3
f.	1 ea. TCS-12	40W A-1, 20W A-3
g.	1 ea. Custom Built "M-Boat" transceiver	25W, A-3

4. Frequencies in use are as follows:

a.	317 kc/s	300 watts
b.	500 "	300 "
c.	2182 "	25 "
d.	2686 "	40 "
e.	2724 "	25 "
f.	3290 "	600 "
g.	6708 "	600 "
h.	7790 "	400 "

i.	7878 kc/s	600 watts
j.	7935 "	25 watts
k.	9009.5 kc/s	600 watts
l.	10,105 "	1 KW
m.	11,401 "	1 KW

5. An "on-call" radiobeacon service is available, call sign YAP, on 317 kc/s with 300W power, maximum.

6. Transmitting and receiving antennas in use are simple vertical wires and doublets.

7. The only electronic installation at the U. S. Weather Bureau station is a GMD type balloon tracking equipment.

8. All YAP Island power distribution circuits are above ground. A very basic, magneto type, two wire I.C. telephone system is in operation on YAP between the residence of the DISTAD REP, Radio Station, Constabulary and Fire Department and Hospital. Wiring is above ground.

9. Harmful interference to, or from, Loran-C operation and the facilities discussed is considered unlikely.

F. LORAN-A CONSIDERATIONS

1. The proposed Loran-C site contains sufficient space to allow collocation of Loran-C and Loran-A transmitting facilities. It is proposed that a high power, double pulsed, master station be established, LORSTA ULITHI be disestablished, and the Marianas Loran-A chain reconfigured as follows:

a. Rate 2L1 Palau (Slave) - YAP (master, vice Ulithi)
b. Rate 2L2 Guam (Slave) - YAP (master, vice Ulithi)
c. Rate 2L3 Guam (Slave) - Saipan (master)

2. A comparison of Loran coverage for rates 2L1/2L2 with master locations at ULITHI (existing) and YAP (proposed) is shown in enclosure (5) located in envelop on the back cover. For low power YAP operation there would be some reduction in fix coverage over the existing configuration; however, high power operation will offset these losses and result in minor gains in fix, and line of position service areas.

3. Distances to paired stations and propagation paths are as follows:

a. From YAP to Palau - GCB 237°

1.25 N.M. overland GAGIL-TOMIL
1.0 N.M. seawater

4.25 N.M. overland YAP
284 N.M. total path

b. From YAP to Guam - GCB 59° 19'

0.8 N.M. overland GAGIL-TOMIL
444.2 N.M. seawater
445 N.M. total path

4. Computed field intensity, based on high power double pulsed YAP operation:

a. at PALAU - 1920 uv/m
b. at GUAM - 480 uv/m

5. Computed field intensity at YAP, from:

a. PALAU, based on 160KW radiated - 1300 uv/m
b. GUAM, based on 128 KW radiated - 215 uv/m

6. Loran-A field intensity measurements were made using the TS-318/UP test set at the Weather Bureau site on YAP, described earlier. Results tabulated here are the averages of four observation periods, each covering at least an hour on four successive days during midmorning and early afternoon periods:

	Station	Measured	Computed
a.	Guam	207 uv/m	215 uv/m
b.	Palau	1290 uv/m	1300 uv/m
* c.	Saipan	100 uv/m	70 uv/m
* d.	Ulithi	19,000 uv/m	14,000 uv/m

*For information.

7. A plot of predicted 1850 kc/s band noise levels for four hour time blocks over the entire year, based on CCIR report #65 and corrected for 35 kc/s receiver bandwidth, appears as enclosure (6). The annual median noise is 4 db above 1 uv/m (1.6 uv/m) and the maximum noise expected is 40 db above 1 uv/m (100 uv/m). On the basis of the maximum noise level, the limiting S/N ratio at YAP will be:

a. from GUAM - 2 to 1
b. from PALAU - 13 to 1

and at the slaves the limiting S/N ratios will be:

c. at PALAU - 19 to 1
d. at GUAM - 5 to 1

8. No synchronization or monitoring difficulties are envisioned.

G. COMMUNICATIONS FACILITIES

1. There are no existing communications facilities on GAGIL-TOMIL. Trust Territory facilities on YAP, however, can be used for interim and emergency communications.

2. For communications with other stations of the Loran systems, radio-telephone and RTTY circuits will be required. Installation of the standard SSB, Loran C station equipment complement is recommended. Provision of an H.F. or U.H.F. circuit between the GAGIL-TOMIL site and the Trust Territory radio station on YAP Island is also recommended. YAP radio currently maintains a continuous watch on 2686 kc/s for communication with LORSTA ULITHI. The same arrangement with GAGIL-TOMIL should be satisfactory.

3. Provision of an amateur radio station is recommended.

H. GENERAL

1. Assuming 1:1 S/N synchronication requirement criteria, synchronization at YAP and monitoring at IWO JIMA may be marginal at times. On the basis of the 100 kc/s noise data developed for YAP in enclosure (2), and an expected signal level from IWO JIMA of 398 uv/m (52 db above 1 uv/m), it is expected that noise will exceed the signal as follows:

Probability % of Time Noise Will Exceed 398 uv/m

Time of Day	Winter	Spring	Summer	Fall
00-04	8 %	13 %	24 %	15 %
04-08	3.5%	26 %	32 %	9 %
08-12	0.5%	1.4%	1.2%	1.4%
12-16	2.5%	1.8%	14 %	2.3%
16-20	7.0%	32 %	46 %	14 %
20-24	8 %	13 %	24 %	15 %

Cross rate monitoring at YAP is not considered feasible.

2. It is doubtful that accurate monitoring of the M-W leg can be accomplished at SAM, OSHIMA, JAPAN. It is therefore recommended that a monitor for this leg be established at the CG Depot, CABRAS ISLAND, GUAM. Plots of the median and 95% reliability noise for GUAM appear as enclosures (7) and (8). The median annual noise is 37 db above 1 uv/m, and the 95% reliability index noise level is 57 db above 1 uv/m. For information, the following S/N ratios will apply at monitor GUAM based on the noise figure of 57 db above 1 uv/m (708 uv/m):

a. from YAP, for 750 KW radiated, and a 445 N.M. overwater path -- 6 to 1

b. from IWO JIMA, for 750 KW radiated, and a 725 N.M. overwater path -- 2 to 1

c. from MARCUS IS., for 750 KW and an 885 N.M. overwater path -- 1 to 1

3. The radio frequency spectrum from 16 to 250 kc/s was monitored at CABRAS ISLAND, GUAM, during each of the time blocks throughout the day on 23 - 24 January 1963 and on 29 - 30 January 1963. Results are tabulated on enclosure (9). In band frequency products were detected as follows:

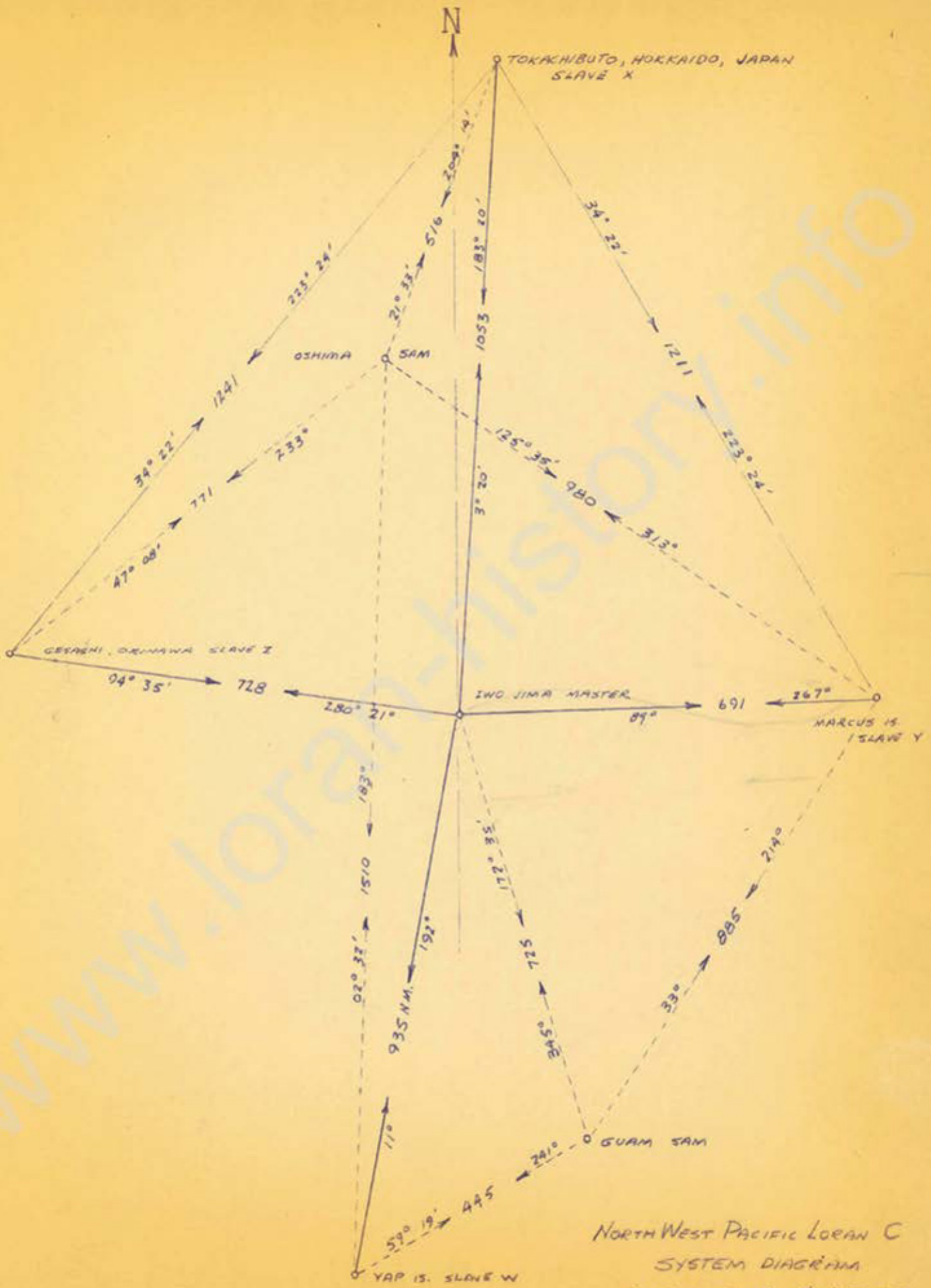
Freq. kc/s	Emission	F.I. db above 1 uv/m
90.5	CW	26
93.5	RATT	49
109.5	RATT	47
111.8	RATT	31

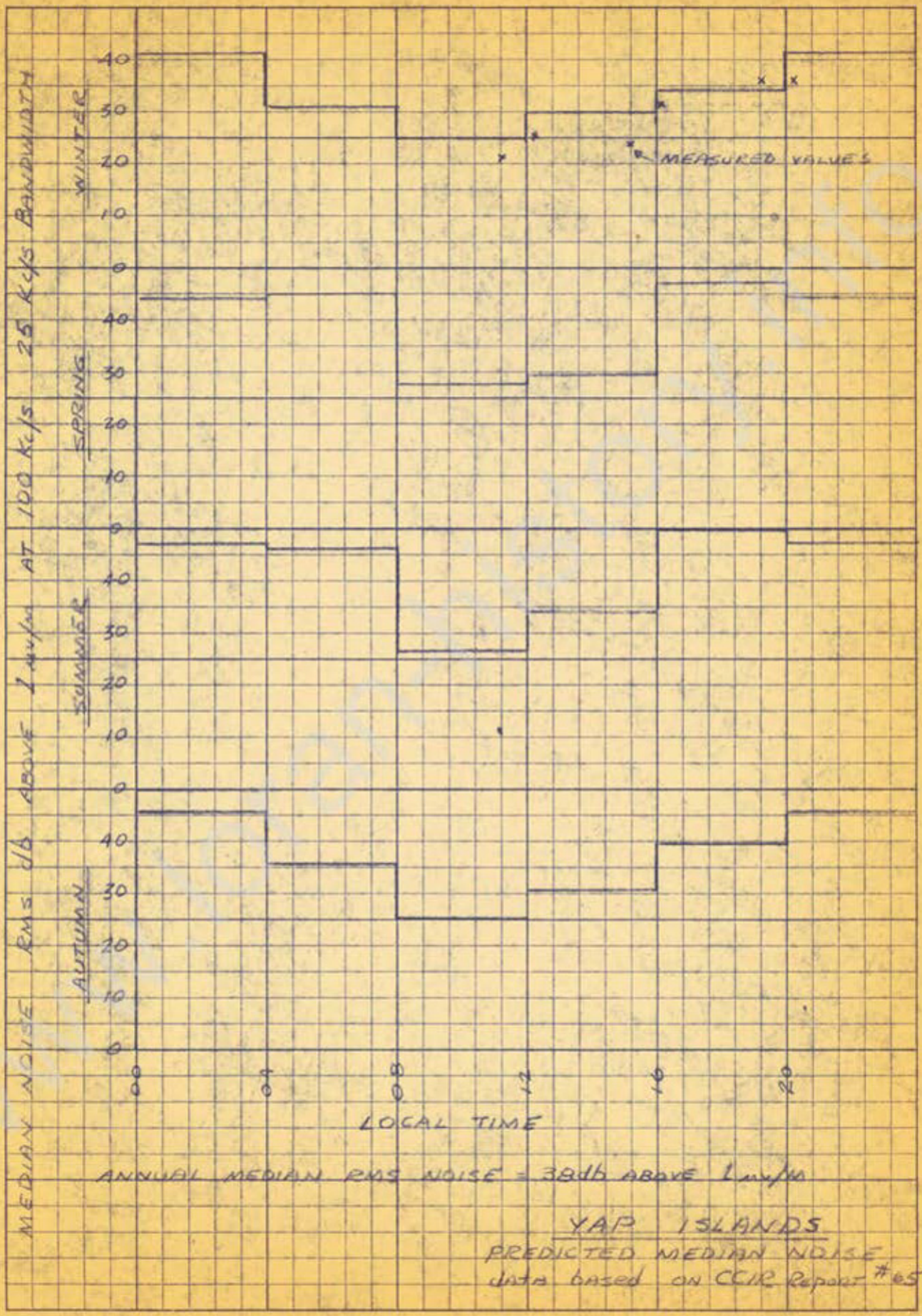
Noise measurements at 100 kc/s are plotted to the same scale as computed noise on enclosure (7). Computed/measured correlation is good.

4. Installed U. S. Navy LF facilities at GUAM (NPN) are listed for information:

Freq. kc/s	PWR. KW	Emission
14.7	1000	A1
15.3	1000	A1
127.5	10	A1/RATT
139.1	3	A1
155	15	RATT
484	2	A-1
500	2	A-1
385	6	FAA Beacon ZET
212	1	USAF Beacon GUM

5. A suggested electronic plot plan for Loran A/C Station YAP is shown in enclosure (10). Physical site considerations (ground plane, tower and guy anchor requirements) dictated the location of the Loran-C radiator. The Loran-A transmitting antenna is located for unobstructed baseline take-off to GUAM and PALAU. Other antennas are deployed in the remaining space for optimum separation consistent with cable length limitations and available real estate. Loran-C receiving antenna interconnecting cable will be approximately 600 feet long, Loran-A 1000 feet, and communications antennas well under 1000 feet long.


N
TOKACHIBUTO, HOKKAIDO, JAPAN
SLAVE X
OSHIMA SAM
GESAENI, OKINAWA SLAVE Z
IWO JIMA MASTER
MARCUS IS.
ISLAVE Y
GUAM SAM
YAP IS. SLAVE W
1053
516
1211
1241
771
728
691
980
1510
935 N.M.
725
885
445
NORTH WEST PACIFIC LORAN C
SYSTEM DIAGRAM
APPROX SCALE 1" = 200 N.M.
ENCL. (1)



ANNUAL MEDIAN RMS NOISE = 38db ABOVE 1 mv/m

YAP ISLANDS

PREDICTED MEDIAN NOISE

Data based on CCIR Report #65

K&E 5 X 5 TO THE INCH 359-2 KEUFFEL & ESSER CO.

ENCL (2) 1 OF 2

PREDICTED MEDIAN NOISE LEVELS PER CCIR REPORT #65
FOR YAP ISLANDS

Season	Time of Day	Noise Grade	Noise Level in db Above 1 uv/m 1 kc/s Bandwidth	25 kc/s Bandwidth
Winter	2000 - 0400	71	28	42
	0400 - 0800	58	18	32
	0800 - 1200	26	10	24
	1200 - 1600	39	16	30
	1600 - 2000	62	22	36
Spring	2000 - 0400	75	30	44
	0400 - 0800	61	31	45
	0800 - 1200	31	14	28
	1200 - 1600	35	15	29
	1600 - 2000	65	33	47
Summer	2000 - 0400	78	33	47
	0400 - 0000	63	32	46
	0800 - 1200	30	13	27
	1200 - 1600	34	26	40
	1600 - 2000	72	37	51
Fall	2000 - 0400	76	31	45
	0400 - 0800	64	23	37
	0800 - 1200	31	14	28
	1200 - 1600	39	16	30
	1600 - 2000	68	25	39

AVERAGE ANNUAL MEDIAN NOISE LEVEL 38 db ABOVE 1 uv/m

K&E PROBABILITY SCALE 359-23
X 90 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

% TIME EACH TIME BLOCK NOISE EXCEEDS +50dB

TIME	WINTER	SPRING	SUMMER	AUTUMN
00-04	6.0	20.0	34.0	28.0
04-08	5.0	32.0	36.0	10.0
08-12	1.2	1.8	1.8	1.2
12-16	3.5	2.8	16.0	4.0
16-20	7.0	34.0	50.0	16.0
20-24	6.0	20.0	34.0	28.0
	28.1	110.6	171.8	77.2
AVERAGE	4.8	18.4	28.7	12.9

ANNUAL AVERAGE 16.2%

98.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01

0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99

100 kHz NOISE dB ABOVE 1 micro-watt/m - 25 KC/S BANDWIDTH

90 70 60 50 40 30 10

65dB

MEDIAN NOISE

YAP ISLANDS

% TIME NOISE EXCEEDS GIVEN LEVEL

RADIO FREQUENCY MEASUREMENTS

YAP ISLANDS

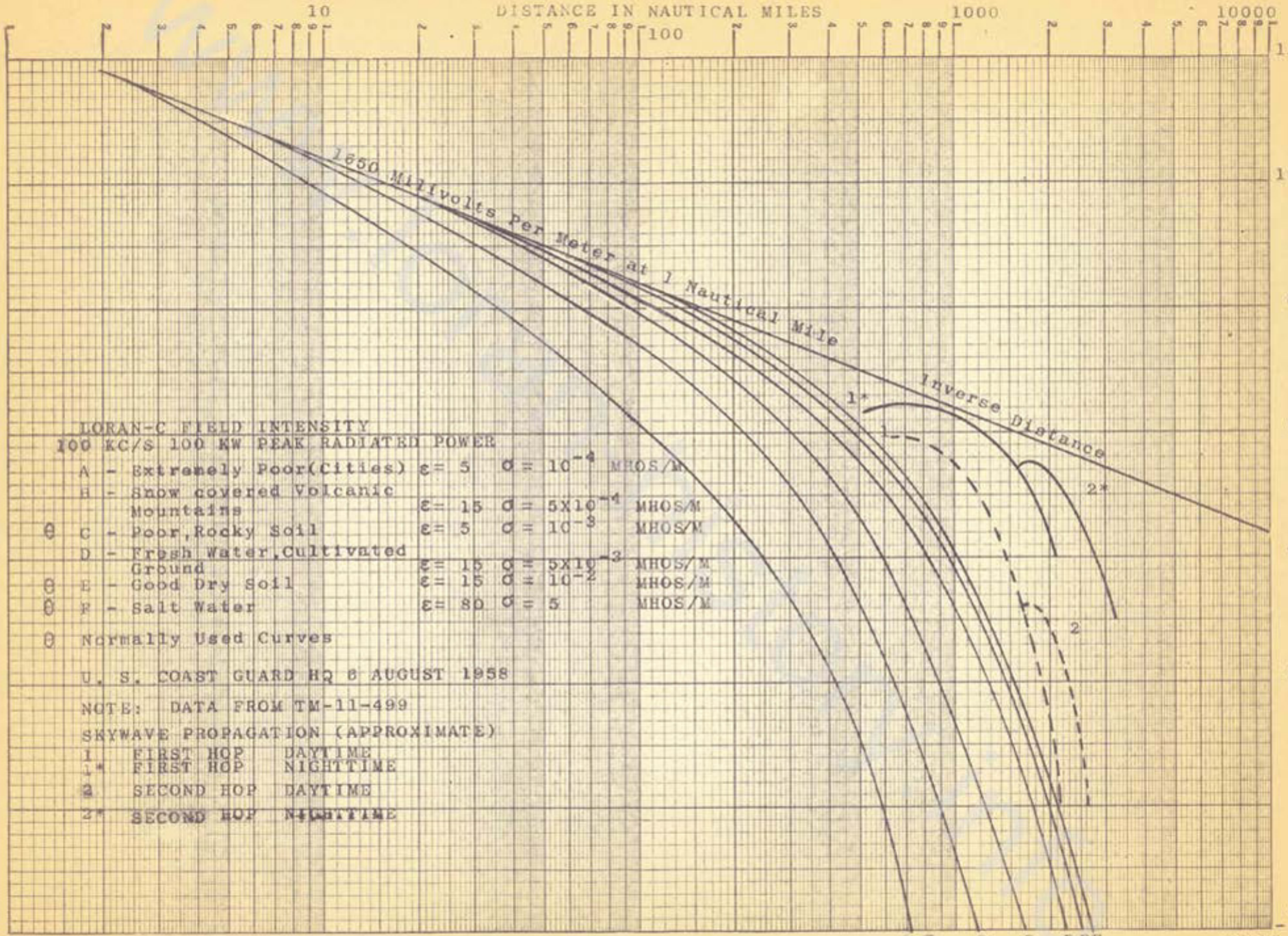
Measurements were taken at the U. S. Weather Bureau Station on YAP Island, approximately 3 miles from the proposed GAGIL-TOMIL Island site, using a model AN/URM-6 F.I. meter. Measurements were conducted on 17 and 18 January 1963, inclusive.

F.I. Rms db Above 1 uv/m

Freq. kc/s	Emission	00-04	04-08	08-12	12-16	16-20	20-24
44.0	RATT			18	18		
51.5	RATT				10	12	
74.0	CW			6	7		
83.2	CARRIER			6	7		
90.5	CW			13	11		
100.0	ATMOSPHERIC NOISE			7	10	17	15
112.0	CW						19
122.0	RATT						10
126.0	CARRIER						23
127.5	RATT			16		30	24
136.0	CW			25	25	35	41
139.0	CW			13	15	31	39
155.0	RATT			15		26	23
159.0	RATT			23		41	52
173.0	BROADCAST					6	23
190.0	A-3					5	
199.0	RATT					8	6
212.0	CARRIER			4	6	13	15
230.0	CARRIER			7	7	22	
245.5	CARRIER			10	10	34	32

Numerous weak signals heard above 200 kc/s to the 250 kc/s receiver limit.

K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO. MADE IN U.S.A.
4 CYCLES X 70 DIVISIONS



LORAN-C FIELD INTENSITY
100 KC/S 100 KW PEAK RADIATED POWER

A - Extremely Poor(Cities)	$\varepsilon = 5$	$\sigma = 10^{-4}$	MHOS/M
B - Snow covered Volcanic Mountains	$\varepsilon = 15$	$\sigma = 5\times10^{-4}$	MHOS/M
C - Poor,Rocky Soil	$\varepsilon = 5$	$\sigma = 10^{-3}$	MHOS/M
D - Fresh Water,Cultivated Ground	$\varepsilon = 15$	$\sigma = 5\times10^{-3}$	MHOS/M
E - Good Dry Soil	$\varepsilon = 15$	$\sigma = 10^{-2}$	MHOS/M
F - Salt Water	$\varepsilon = 80$	$\sigma = 5$	MHOS/M

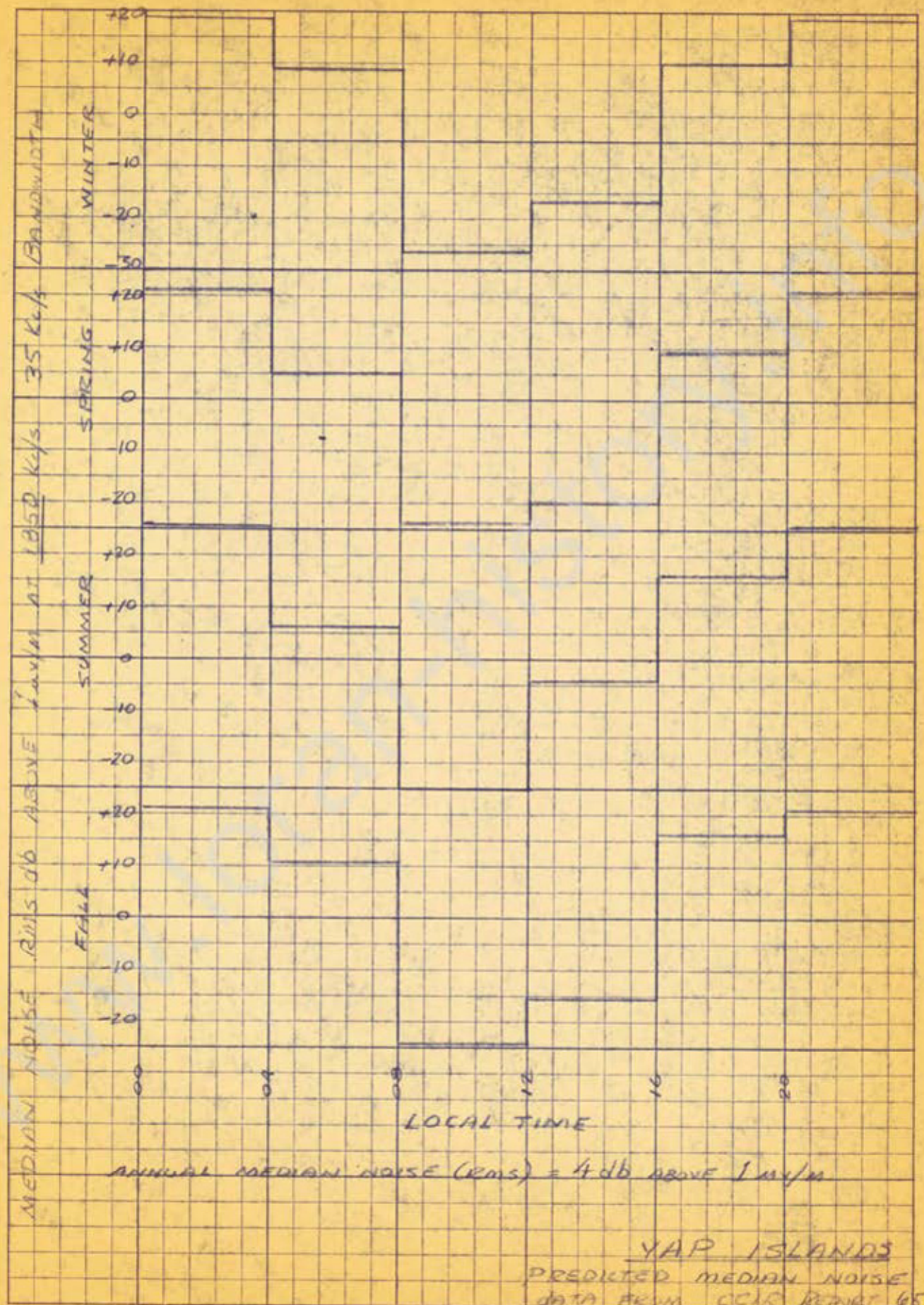
Normally Used Curves

U. S. COAST GUARD HQ 6 AUGUST 1958

NOTE: DATA FROM TM-11-499

SKYWAVE PROPAGATION (APPROXIMATE)

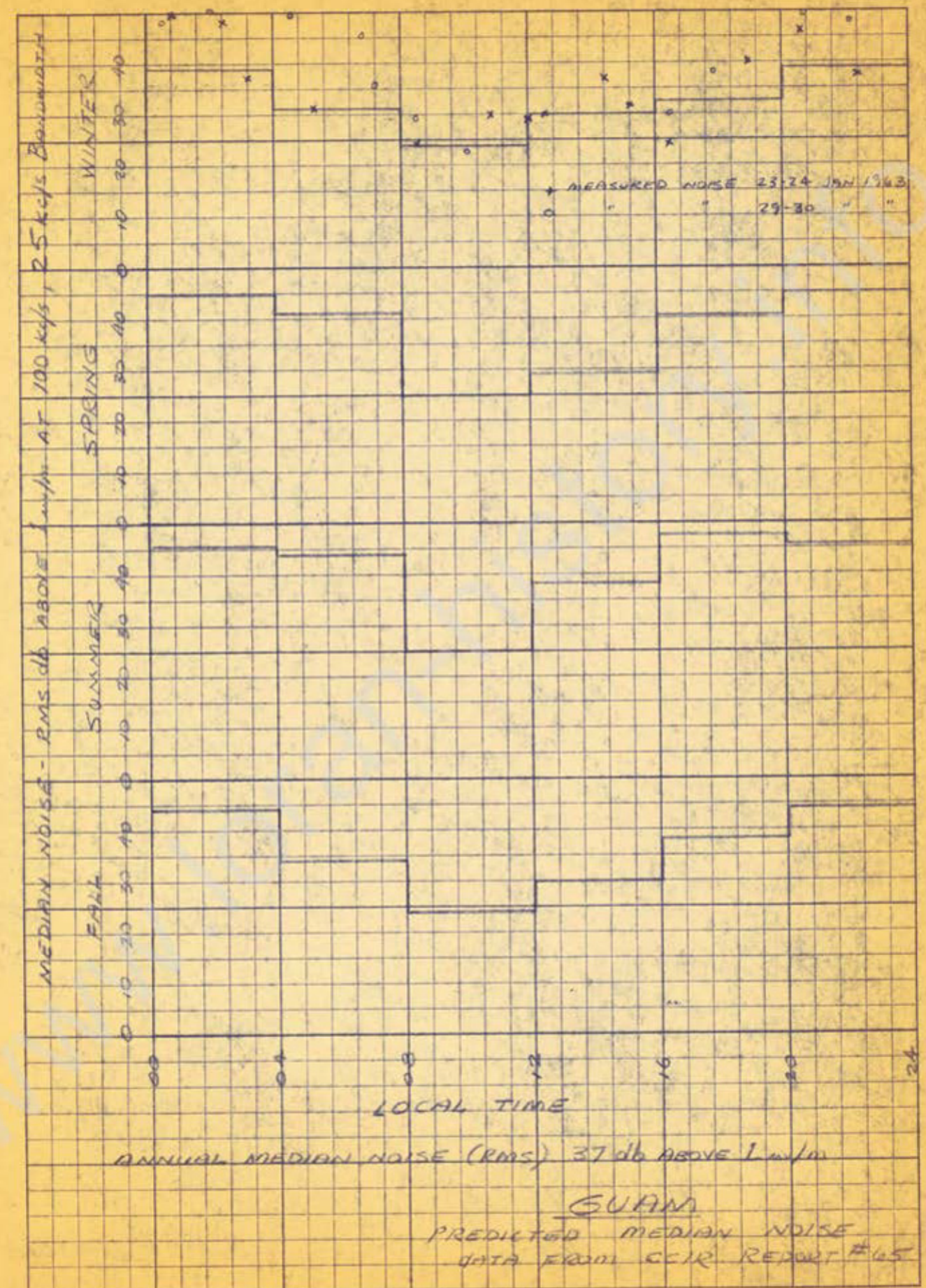
1 FIRST HOP DAYTIME
1* FIRST HOP NIGHTTIME
2 SECOND HOP DAYTIME
2* SECOND HOP NIGHTTIME



ANNUAL MEDIAN NOISE (EMS) = 4 db ABOVE 1 μv/m

YAP ISLANDS
PREDICTED MEDIAN NOISE
DATA FROM CCIR REPORT 65

ENCL (6)



ANNUAL MEDIAN NOISE (RMS) 37 db ABOVE 1 w/m

GUAM

PREDICTED MEDIAN NOISE
DATA FROM CCIR REPORT #65

ENCL (7)

K•E PROBABILITY SCALE 359-23
X 90 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

% TIME EACH TIME BLOCK NOISE EXCEEDS +50 dB

TIME	WINTER	SPRING	SUMMER	FALL
00-04	6.0	24.0	28.0	20.0
04-08	6.0	24.0	30.0	7.0
08-12	0.9	1.1	1.2	0.9
12-16	3.5	3.0	14.0	3.5
16-20	6.0	30.0	42.0	14.0
20-24	6.0	24.0	28.0	20.0

ANNUAL AVERAGE $\frac{342.1}{24} = 14.26\%$

99.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01

80 70 60 50 40 30

100 Kc/s NOISE dB ABOVE 1 μv/M 25 Kc/s BANDWIDTH

STD

GUAM

% TIME NOISE EXCEEDS GIVEN LEVEL

20

0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99

[8] 7244

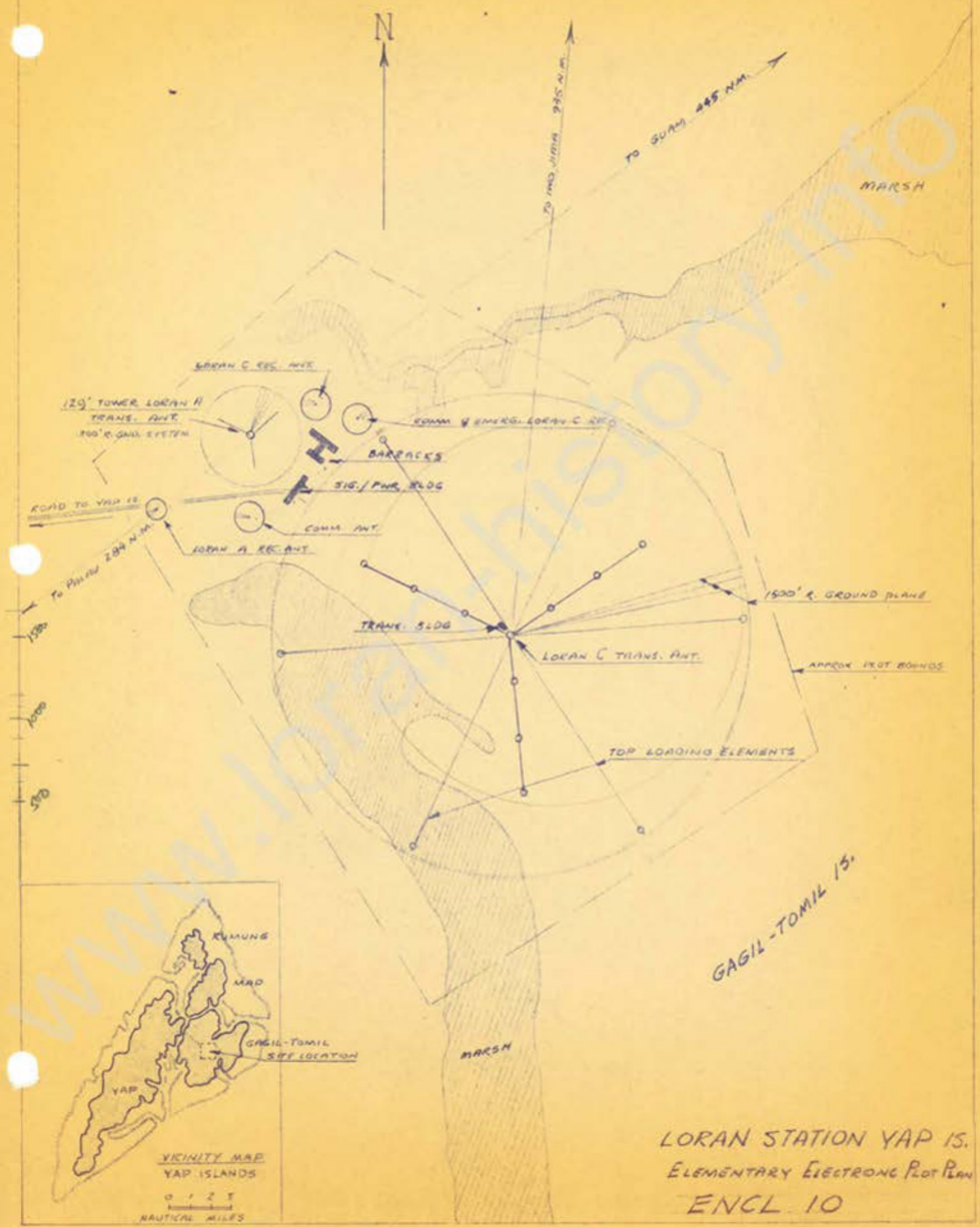
RADIO FREQUENCY MEASUREMENTS

CABRAS IS., GUAM

Measurements were made at the USCG Depot, Guam, using a model AN/URM-6 F.I. meter. Measurements were conducted 23 - 24 January 1963, inclusive, and 29 - 30 January 1963, inclusive. Tabulated data is for maximum values observed during time blocks for the entire test period, except for 100 kc/s noise measurements. All these measurements are listed.

		F.I. Rms db Above 1 uv/m					
Freq. kc/s	Emission	00-04	04-08	08-12	12-16	16-20	20-24
75.7	RATT	41	45	36	34	25	31
83.3	RATT	42	41	27			27
87.0	RATT		45				27
90.3	CW	40			20		27
98.0	RATT		25				
100.0	NOISE	36	21	9	14	8	30
		23	15	14	16	14	21
		25	17	9	14	19	36
		37	20	12	21	12	37
109.5	A-3						47
111.8	RATT	38	46	20			33
113.7	CW				18	14	
117.0	RATT		20				
123.0	RATT	34	30		17	13	26
127.8	RATT	73	73	55	73	69	70
130.3	RATT				11	6	17
133.2	RATT						19
136.2	CW	43	50		27		
139.0	CW	72	73		75	70	
151.0	RATT	44	37				25
155.0	RATT	69	71	70	70	65	70
159.0	RATT	57	57		24	12	
163.3	RATT	29	14				
172.3	RATT	38	27		7	6	14
187.0	CARRIER	35			14	16	12
199.8	RATT	39				12	27
211.0	MCW	56	60	55	60	49	34
216.0	RATT	30	36			19	24
226.8	A-3	50					34
236.0	A-3	35	34			35	52
245.2	MCW		68			38	34

ENCLOSURE (9)



LORAN STATION YAP 15.

ELEMENTARY ELECTRONG PLOT PLAN

ENCL 10

YAP ISLANDS

SITE SURVEY REPORT

CIVIL ENGINEERING REPORT

YAP ISLANDS LORAN A-C STATION

SITE SURVEY

CIVIL ENGINEERING REPORT

A. SITE AND ANTENNA LOCATION

1. Local Name for Site: Yap Islands Loran A-C Station.

The site is located on GAGIL-TOMIL Island, which is one of the four main islands designated as Yap Islands in the West Caroline group of islands. It is located in the central plains area of GAGIL-TOMIL, approximately 100 feet above sea level.

2. Geographic Position of Antennas

The transmitting antennas will be located approximately as follows:

Loran A	9° - 32' - 33" N	138° - 10' - 13" E
Loran C	9° - 32' - 20" N	138° - 10' - 29" E

The exact geodetic positions will be determined later by a team of Navy Oceanographic Office engineers.

3. Antenna Location Monuments

Each antenna location is marked by an official bronze Coast Guard disk brazed to a 2½" steel pipe driven into the ground approximately three feet and projecting approximately 8 inches above ground. The disks are stamped "A-ant" and "C-ant." Each monument is witnessed by three unmarked 2½" steel pipes driven about three feet into the ground and projecting about 8 inches above ground. Distances and bearings from each of the antenna monuments are as follows and as shown on Drawing 14-Yap Islands-001, Rev 0, enclosed.

WITNESS DATA

LORAN ANTENNA	WITNESS	AZIMUTH FROM ANT. MONUMENT	DISTANCE
"A"	W-1	60° - 53' - 00"	200.00'
	W-2	128° - 03' - 00"	512.20'
	W-3	280° - 53' - 00"	200.00'
"C"	W-4	60° - 53' - 00"	200.00'
	W-5	180° - 53' - 00"	200.00'
	W-6	300° - 53' - 00"	200.00'

4. Chart Showing Site Location

Navy Hydrographic Office Chart No. 5421A and U. S. Army Map Service Chart 1850 IV, SE, copies enclosed, show the locations of the two transmitting antennas.

5. Boundary Description

Two parcels of land are required, one for the general station site and the other a 300 foot square parcel for the fuel tank farm. The survey required to establish the boundaries on the ground will be conducted by the Trust Territory.

The following is the description of the area required for the station proper and is also shown on the attached plot plan.

> "Beginning at a point, from which a U. S. Coast Guard bronze disk set in a 2-inch steel pipe and labelled C-ANT, bears 285°-05'-00" true and 2070± feet; thence 336°-55'-00" true, 1970± feet to point "B"; thence 291°-28'-00" true, 2760± feet to point "C"; thence 223°-40'-00" true, 2000± feet to point "D"; thence 141°-55'-00" true, 3970± feet to point "E"; thence 52°-00'-00" true, 2830± feet to the point of beginning comprising an area of 260 acres, more or less on Gagil-Tomil Island, Yap Islands, Trust Territory, Pacific Islands, all as shown on the attached drawing No. 14-Yap Islands-001 Rev. 0, revised 2-2-63 and entitled Yap Islands Site Survey, Plot Plan."

In addition to the above property, rights of way will be required for the fuel oil pipeline and permits for improving or constructing roads. A preliminary official request has been directed to the High Commissioner, Saipan, for information on the proper procedure to be followed in obtaining the use of land and for rights of way.

6. Photographs

Photographs are attached showing panoramic views of both the proposed "A" and "C" sites taken from the respective antenna location monuments, along with photographs showing other pertinent details.

7. Aerial Photographs

Selected high altitude photograph taken in 1946 and a low altitude oblique photograph taken in 1958 are attached.

B. CONDITIONS AFFECTING MOVEMENT OF EQUIPMENT TO ACTUAL SITE

1. Nearest Harbor or Anchorage

Tomil Harbor is the only harbor at Yap. The entrance, which is narrow and winding, is marked by an LST aground on the reef on the west side. A sunken derelict, which, it is said, shifts occasionally lays close to the west side of the channel. There is a 2½ fathom shoal between the two wrecks. The reef edge along the channel is marked by unlighted beacons. Ships larger than an FS must anchor in the area northeast or south of Domitsch Island where the water is from 15 to 18 fathom deep. The anchorage is unprotected from the south and southeast, however, swells are not serious.

The best anchorage is between Domitsch and Bi Islands in 12 to 19 fathoms with a mud bottom which affords good holding ground but is somewhat restricted in area. The Trust Territory UF-1 aircraft uses this area for landing. The northern part of the harbor is winding and unsuitable for anchorage.

A dock built in 1948 at Colonia can accommodate one FS at a time. The dock is constructed of steel sheet pile forming an "L" 200 feet by 60 feet. There are two warehouses, one belonging to the Yap Trading Co. and the other to the U. S. Trust Territory.

2. Beaches for Landing

LCM type boats may be landed only at high tide at a point 1/4 mile south of the pier at Teb. This landing terminates at the road that runs by the proposed POL storage area and is shown on the attached map. Access to the station site will be by road from Colonia. Roads must be improved or built and one bridge will be required.

3. Mobile Equipment Required:

The usual equipment necessary for grading and construction work such as bulldozers, cranes, concrete mixers, road machinery, trucks and low bed trailers, trenchers or back hoes, water tank trailers, rock crushers, and sand and rock screening equipment will be required.

4. Landing Craft Required

Until such time in the very distant future, perhaps never, that a deep draft wharf is constructed at Colonia, any ship larger than a WAGL will have to discharge cargo onto barges or an LCM for lightering ashore at Colonia. The Trust Territory ship, the Errol, an FS, does tie up to the dock; however, it is reported that at low tide she rests on the mud bottom. The Trust Territory maintains at Yap one 100 ton steel barge and one LCM which are available at a nominal rental fee. After unloading at Colonia all cargo except fuel will be trucked to the station.

5. Existing Transportation Facilities

The Trust Territory operates UF aircraft and surface vessels between Guam and Yap (see Operations portion of this report for details). There are no existing transportation facilities on any of the Yap Islands. The siting party landed the first American vehicle, a jeep, on GAGIL-TOMIL Island.

6. Availability of Stevedoring and Local Labor

A limited amount of local labor is available for stevedoring but would not be sufficient for the quantity of cargo involved in the mobilization of the Coast Guard construction contractor. Skilled labor is very scarce, being barely sufficient for the Public Works Office of DISTAD Yap.

7. Road Construction Necessary

Prior to the war, the Japanese graded a road north from Rumm to the Tagerem Canal. This road was never surfaced and today exists as a grade only, overgrown by weeds and fern in several places. This road will have to be rebuilt for a distance of approximately 1.7 miles. The construction of a bridge, with a 30 foot span, across the Tagerem Canal is required. The 7.0 mile road from the Tagerem Canal to the site exists as a grade only, overgrown in many places by weeds, fern, and overhanging trees and badly eroded in several places.

It is anticipated that there will be a 1.6 mile jeep road built along the route of the POL line from the site to the tank farm to the station access road. Some grading is required in places to accomplish this. The road from the LCM landing to the tank farm is unsurfaced and should receive a layer of coral.

8. Air Transportation Facilities

As mentioned under paragraph B-5 above, the Trust Territory operates a UF aircraft between Guam and Yap. There is a crushed coral runway under construction approximately 4½ miles southwest of Colonia. At present, approximately 3400 feet by 200 feet wide is usable. Coast Guard HU-16E and C-123B aircraft have landed successfully on this strip. Plans are underway to conduct a HC-130B test landing within the next month. To date, the Trust Territory aircraft do not have the required FAA approval to use the strip and therefore are still making water landings. See the Operations part of this report for a description of facilities available at the airport.

C. ACTUAL SITE CONDITIONS

1. Topography of Site

The site is located to the westward of the eastern ridge of Gagil-Tomil on a plateau approximately 100 feet above sea level.

The land to the east of the C-antenna location is relatively flat out to 500 feet and is gently rolling from there out to 1500 feet, with a thickly wooded area on the periphery. The area to the south is gently sloping except for a 15 foot deep swale and a 30 foot depression with a swamp below which cuts the area at approximately 1000 feet from the antenna location monument. The area to the west is somewhat wooded and is cut by two swales each depressed approximately 15 feet. The area to the north is gently to moderately sloping and is cut by a swale on the northern boundary. The POL storage area is moderately sloping with numerous ditches 2 or 3 feet in depth, once used in farming by the Japanese.

2. Vegetation and Tree Cover

The site is primarily covered with scattered pandanus trees, grass and fern. The pandanus trees are about 15 feet high with trunks and branches about 6 to 8 inches in diameter. Thick growths of fern are found in places up to 3 feet in height. Fern covers a large portion of the area in nearly a continuous blanket except where erosion scars and dry washes bare of any vegetation interrupt the continuity. Vegetation in the marsh in the south is thick and varied. The forest and thick brush on the east boundary consist of broadleaf trees and thin undergrowth in the forest with a dense thicket of fern at the boundary of the forest.

3. Ground Conditions and Geology of the Site

The site area consists primarily of reddish, granular, well drained acid clays, with gravelly limonitic surfaces underlain by very deep weathered, clay-textured volcanic rocks. The marsh in the southern area of the site is dominantly clay high in organic matter. The ground is badly eroded in the western area of the site and the marsh in the south is poorly drained.

Especially in the vicinity of the bridge across the Tageren Canal, the uncompleted Japanese airstrip and the fuel tank farm, there are numerous bomb craters. It is recommended that a demolition team be present during any earthmoving operations in these areas.

4. Earthwork Required

No unusually large earth moving project will be required.

5. Foundations for Structures, Engines, etc.

Soil borings are being obtained to provide a basis for the design of foundations. It is expected that piling will be required for the Loran C tower and possibly one or two of the top loading elements. Piling will also be required for the Tageren bridge abutments.

6. Termite Proofing

This will be required.

7. Local Source of Construction Material

Yap is short of first-rate engineer construction materials. There is no lumber or stream gravel. Fresh, hard rock such as trap rock is not available. Greenschist containing lenses of hard rock, breccia containing hard rock fragments in a fine-grained matrix, and coral limestone of the coral reef are the chief rock types. Silty and clayly sands, sandy silts and clayly silts, and fat clays are the chief soil types. Concrete aggregate, surfacing, and base course material of variable but generally only fair quality is available nearly everywhere from the coral reef. Binder material is good and is available in large quantities.

Samples of rock quarried in Colonia by the DISTAF Public Works Office and local sand are being analyzed by the Public Works Laboratory at Guam. The results will be forwarded when received.

8. Pier or Wharf

A concrete launchway is recommended at the point where the submarine fuel oil pipeline meets the shore of Gagil-Tomil Island. The shoreline here is covered with large pieces of coral placed there by the natives. Shoal water (2 feet at low tide) extends out approximately two hundred yards. The launchway is required to launch the station boat during fueling operations and for recreation purposes.

D. UTILITY REPORT

1. Potable Water Supply

The publication "Military Geology of Yap Islands," prepared under the direction of the Chief of Engineers, U. S. Army, states that streams and wells on any of the Yap Islands cannot be depended upon for a year-around water supply. Furthermore, these sources produced water heavily contaminated with fine soil particles. The water supply for the principal town of Colonia is a light brown color leaving the taps.

Accordingly, a water catchment system using the roofs of the station structures is recommended. The table, enclosed herewith, analyzes the potable water storage requirements. Based on this study, it is recommended that 160,000 gallons of potable water storage be provided for this station.

2. Water for Construction Purposes

Water for construction purposes can be obtained from nearby streams.

3. Sewage Disposal System

A percolation test is being conducted by the contract surveyor; however, it is anticipated that this test will indicate that an effluent leaching field will not be practical. In this event, effluent from septic tanks can be discharged into the ravine north of the station. There are no cultivated areas below this point so no objections to this procedure are expected.

4. External Electric Power Supply

No local electric power is available, therefore, the station must generate its own power.

5. Garbage and Refuse Disposal

Garbage grinders should be provided discharging into the septic system. An incinerator should be furnished for disposing of burnable rubbish. Unburnable refuse should be buried.

6. Heating and Air Conditioning

Heating is not required, however, air conditioning of living quarters and electronic spaces is a must due to the prevailing high temperatures accompanied by high humidity.

E. CLIMATOLOGY

1. Precipitation and Sea Conditions

Precipitation and sea conditions are covered under the Operations part of this report.

2. Winds, Storms and Earthquakes

Winds and storm data is covered under the Operations part of this report. Earthquakes have not been recorded in Yap.

3. Atmospheric, Dust and Humidity Conditions

There will be no dust condition at the site but the high humidity will create a problem. Salt spray will not be serious, however, corrosion-resistant hardware should be specified. Air conditioning of living and electronic spaces is definitely required. Heating elements must be provided in lockers, closets, etc. to reduce the mildew problem.

4. Sea Conditions Affecting Landing

This is described in the Operations part of this report. There will be no problems except at the harbor entrance where the channel is restricted by a shoal allegedly caused by a sunken wreck. The contract surveyor is required to perform a hydrographic survey at this location to determine whether any dredging will be required.

5. Construction Season

Construction can be performed during the entire year although during the wet months, July through November construction, especially, earthwork will be difficult.

F. CONDITIONS AFFECTING CONSTRUCTION FORCE

1. Nearest Habitation

Colonia, on Yap Island, is the only town in the Islands. Adequate hotels and restaurants for a construction force are non-existent. A contractor cannot expect any support from the facilities at Colonia except dock space, communications, the post office, the small hospital for emergency treatment, and rock from the town quarry providing tests prove it acceptable.

2. Endemic Diseases

See paragraph E(10) of the Operations part of this report.

3. Transportation, Communications, and Postal Facilities

Facilities available at Yap are described under the Operations part of this report.

4. Construction Camp

A construction camp will be required at the site. All required utilities must be furnished by the contractor. Attention is particularly invited to the need for a catchment system which will be required for potable and sanitary water. Due to the extremely limited housing and messing facilities available at Colonia, the contractor must be required to provide for furnishing these facilities for government employees during construction of the station.

G. MISCELLANEOUS

1. Recommended Type of Construction

The typical concrete and concrete block construction used at other Loran C stations should be utilized at Yap. Structural members such as roof slabs should be of precast-pretensioned concrete, primarily due to the poor quality of aggregate available locally.

2. Recommended Storage Requirements

Water Storage	-	160,000 gallons
Fuel Storage	-	700,000 gallons
Spare parts	-	6 months
Refrigerated	-	2 months
Dry Stores	-	3 months

3. Fuel Delivery and Storage

There are two possible means of delivering bulk fuel to Yap; (a) by MSTS tanker or (b) by the Trust Territory vessels. Detailed information has been requested from the operators relative to capabilities, costs, etc. This data will be forwarded to the Commandant upon receipt.

The suggested tanker mooring location, the alignment of the fuel line and location of storage facilities are shown on the maps accompanying this report. It is anticipated that a booster pump will be required to overcome the vertical lift of approximately 100 feet and friction loss in the pipeline. It is recommended that the main part of the fuel storage be located close to the point where the pipeline reaches the shoreline. The location selected is indicated on the enclosed maps; however, based on first reports of borings made, slight adjustment may be required due to poor subsoil and ground water. No suitable location for fuel storage nearer to the shoreline is available.

After a detailed analysis of the pumping problem, it is possible that the storage facility may be located at the station site without an unduly long pumping operation direct from a tanker.

A submerged fuel line from the shoreline to the tanker mooring is recommended. The depths are shallow and the water relatively calm. At the outer end, it is recommended that a riser pipe be used secured to a precast-pretensioned concrete pile dolphin, with hose connection to the tanker.

4. Prospective Contractors

E. E. Black, Ltd. - Honolulu
Jas. W. Glover, Ltd. - Honolulu
Hawaiian Dredging and Construction Co. - Honolulu
Chris Berg, Inc. - Portland, Oregon
Morrison Knudsen - Honolulu
Paul Hardeman, Inc. - Okinawa
Koster & Wythe, Inc. - Guam

5. Antenna Obstruction Lighting

Obstruction lighting for the large antenna is required and should comply with FAA regulations.

WATER STORAGE REQUIREMENTS

YAP ISLAND

Assumptions

a. Complement equal to LORSTA Johnston Island, 27 men; say 30 men.

b. Roof area equal to LORSTA Johnston Island, approximately 25,000 square feet.

c. Only 67% of the rainfall is caught; the balance is wasted or lost.

d. Water use is 60 gallons per day per man, including both potable and sanitary water.

Data

a. Gallons of water caught = inches of rain/12 x 2/3 x 25,000 sq. ft. x 7.5 gal. = 10,400 x inches of rain.

b. The driest year of record was November 1953 to October 1954, with 98.98 inches of rain. In this year there were four consecutive months, January - April 1954, with a total of only 9.23 inches of rain.

c. Consumption per month = 30 men x 60 gal. x 30 days = 54,000 gallons.

DRIEST YEARLY PERIOD OF RECORD
NOVEMBER 1953 - OCTOBER 1954

Month	Inches Rain	Gal. Water Caught	Gal. Water Used	Deficiency	
Nov 1953	14.65	152,500	54,000		
Dec 1953	12.27	127,500	54,000		
Jan 1954	2.97	30,900	54,000	- 23,100	
Feb 1954	1.93	20,100	54,000	- 57,000	
Mar 1954	2.37	24,600	54,000	- 86,400	
Apr 1954	2.01	20,900	54,000	-119,500	Min. size for storage
May 1954	12.93	134,500	54,000	- 39,000	
Jun 1954	9.91	103,000	54,000	+ 10,000	
Jul 1954	7.33	76,300	54,000		
Aug 1954	8.81	92,400	54,000		
Sep 1954	9.74	101,300	54,000		
Oct 1954	14.06	146,200	54,000		
	98.98				

Based on the above computation, storage capacity should be about 160,000 gallons.

ENCLOSURE (1)

7 March 1963

NAV BRANCH COMMENT

Ref: (a) Yap Islands Electronics Site Survey Report

9. We do not concur with the assumption of paragraph D.3 of reference (a) that the entire Yap Islands land mass is minor for propagation considerations as it affects Loran-A. In addition, the District's method of interpretation of CCIR noise level data is more optimistic than that used by this Branch for Loran-A calculations. Therefore, the coverage contours of enclosure (5) to reference (a) are considered to be a poor representation of the effect of relocating CGLORSTA Ulithi to Yap with a concurrent increase to high power.

10. Coverage diagrams have been prepared by this Branch and forwarded to the Aids to Navigation Division. These diagrams show a predicted loss in both fix and LOP coverage. This loss is not extensive and may prove acceptable.

11. In spite of the above disagreement, we concur that no synchronization or monitoring difficulties should be encountered with Loran-A.

12. The basic Site Survey Report mentions the possible move of CGLORSTA Guam from Cocos Island to Apra Point and the collocation of the Section RADSTA and Loran-C Monitor Station also at this point. Coverage diagrams for and including this move have also been prepared and forwarded to the Aids to Navigation Division.

13. The recommended personnel allowances is considered preliminary and requires further discussion and review in light of recent ~~personnel allowance~~ changes made in other area Loran-C station personnel allowances. It is believed that these differences can be resolved within thirty days.

- YAP - Site Survey Comments - 11, Mar 63

EEE-1

Communications -

1. Telephone lines between the station and Colonia are not considered practical in view of the cable run involved between these points. A VHF/FM radio link would be more desirable for communications between the loran station and points in Colonia.

2. In view of possible changes in the proposed location of the system monitor no comments are being made with regard to this station.

3. A 35 ft whip is presently being used for communications purposes - Is this desirable for Loran C emergency receiving antenna?

Comments.

System Diagram is in error