

IWO JIMA

SITE SURVEY REPORT

GENERAL OPERATIONS INFORMATION

A. Local Name for Site: Iwo Jima, Kazan Retto (Volcano Islands), North Pacific Ocean

1. Site Description.

The site topography is characterized by a combination of low hills, peripheral ridges and random ravines, and scattered outcroppings of rocks. In spite of the described conditions, the site is relatively level in slope. An extremely dense vegetation growth covers a large portion of the site area; this growth consists mostly of young Haolekoa trees. In some places the saplings number up to ten per square foot and range from about 10 to 30 feet in height. Other types of vegetation include Pandanus, Sisal and Scaviola. Site areas not covered by tree growth are either nearly barren or have high grass with scattered bushes. Much of the soil resembles a sandy clay and is saturated with pebbles and rock; the soil is dusty when dry. Much of the rock comprising the outcropping and ridges is a soft sandstone which scars easily. The ground underneath the site is of an equal interest to that on the surface because (1) it is possible that there may be unknown Japanese World War II excavations and (2) there is definite volcanic activity deep within the island as indicated by numerous vents throughout the island (some near the site) emitting hot sulfurous gases, by significant ground faulting, by occasional earth tremors and by a gas explosion as recent as 1957.

B. Land for Site:

1. Ownership and Control.

Iwo Jima is under U. S. military control. The island has no indigenous inhabitants or local land owners. Although Iwo Jima falls within the control area of Commander, Naval Forces, Marianas Islands, the Commander, Fifth Air Force, under PACAF, has been assigned the island for operation, mission support and real estate jurisdiction, by CINCPAC.

2. Whose Jurisdiction and Availability.

a. Non-Private.

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

Commander
Fifth Air Force
Headquarters, U.S. Forces Japan
Fuchu, Japan

Commander in Chief
U.S. Pacific Air Force
Hickam Air Force Base
Hawaii

Commander in Chief
Pacific Forces
Camp H. M. Smith
Hawaii

Commander, Naval Forces, Marianas Islands, and Commander in Chief, U. S. Pacific Fleet should also be kept informed on Coast Guard site acquisition and construction at Iwo Jima.

(2) Availability of Site:

Indications are that a site can be made available for Coast Guard use. Ultimate authorization to locate and construct must come from CINCPAC.

3. Description of Site.

a. General Location.

Iwo Jima is one of three islands in the Volcano Island group and is centered at Latitude 24° 47' N., Longitude 141° 19' E. The Island is very roughly triangular in shape with a length of 4½ miles in a NE/SW direction and a maximum width of 2¼ miles in its northeastern part. Air distance in great circle nautical miles from Iwo Jima to Guam is 710 and from Iwo Jima to Tachikawa, Japan, is 652.

b. Accessibility.

Iwo Jima is accessible by air and sea. There is an excellent 9000' asphalt airstrip on the island. Because there are no sheltered harbors on the island and surface support will be handicapped by beach landings, the prime access to the island will be by air. Roads on the island are in excellent condition and consist of asphalt or compacted dirt, sand and gravel.

c. Other Details of Interest Concerning the Site.

Iwo Jima is formed by two volcanoes, Suribachi Yama at the SW extremity, and Moto Yama at the NE part of the island. The two are connected by a low isthmus. Suribachi is considered extinct and is 544' high. Moto Yama is a flat topped, dome shaped hill which has numerous vents and fissures that emit steam and sulfurous vapor which is highly corrosive to metals and obnoxious to humans. The isthmus connecting Suribachi to Moto Yama is composed of volcanic sand dunes overgrown with high grass and scattered bushes, and it is bordered by a beach of volcanic ash and sand on either side. Although made barren by World War II hostilities, the island vegetation is returning slowly. Numerous Japanese bunkers and fortifications on the island have either been destroyed, buried or sealed.

d. Describe Developments Existing or Planned Nearby Which May Affect Loran Station Operation.

Iwo Jima is a small island. The best island real estate is currently an Air Force Air Base complex. There is no place on the island where a high Loran-C tower can be located without seriously affecting air operations. A large and costly classified weapons storage area is located adjacent to the most desirable Loran Site, but Air Force officials have asserted that the weapons storage area is now unsuited for its originally constructed purpose. Site acquisition may require terms for clearance to cut into part of the special weapons storage area depending upon the station design requirements.

C. Local Officials:

1. Involved with Construction.

CAPT F.A.F. COOKE, USN
OICC, Far East, BUDOCKS
Fleet Activities
Yokosuka, Japan

CDR Fred BRIGGS, USN
WING Project Engineer
Office of OICC, Far East
Fleet Activities
Yokosuka, Japan

2. Persons That Should Be Contacted In The Area.

Commander
Fifth Air Force
Headquarters, U. S. Forces Japan
Fuchu, Japan

Commander
6100th Support Wing
Tachikawa Air Force Base
Japan

Commander
6361st Air Base Squadron
Iwo Jima

Commanding Officer
USCG LORSTA
Iwo Jima

3. Local Population.

Iwo Jima has no indigenous inhabitants.

D. Security:

1. Protection.

None required other than a small arms allowance commensurate with the size of the station and the assigned complement. The nearest significant concentration of U. S. Forces is located at Guam and in the Tokyo, Japan, area.

2. Fencing.

None required except for personnel protection measures at the Loran-C Transmitting Antenna.

3. Additional Security Measures Required.

No additional personnel will be required to provide special security.

4. Small Arms Allowance Required and/or Recommended.

A small arms allowance sufficient to satisfy the requirements of normal security and adequate training is recommended. There is no game to hunt on Iwo Jima except small birds.

E. Personnel:

1. Transportation.

a. United States to General Locality.

Government air transportation is recommended to Guam.

b. General Locality to Site.

Government air transportation from Guam direct to Iwo Jima. Surface transportation is feasible but is not recommended because of the lengthy travel time involved.

c. Personal Vehicles and Licenses.

No personal vehicles are needed or permitted.

d. Other considerations.

Selected personnel assigned should be qualified operators of government vehicles.

2. Medical.

Iwo Jima is isolated from complete medical and dental care facilities. The current practice of depending upon the Air Force Base Dispensary should not be continued. The Coast Guard station definitely needs the attention and care of an assigned Hospital Corpsman to properly carry out the care, routine and administrative requirements prescribed by the Coast Guard Medical Manual. The Air Base Dispensary was inspected and found to be in a deteriorating condition, and it was observed that the morale of Coast Guard personnel at the Loran-A Station was certainly affected by the lack of a Coast Guard Sick Bay and Corpsman. Accordingly, it is recommended that the Loran-C station be equipped with a suitable Sick Bay with an assigned E6 or E7 Hospital Corpsman.

a. Hospitals.

Medical cases requiring hospitalization should be sent to the U. S. Naval Hospital, Guam. Serious cases are always evacuated from Iwo Jima rather than bring a doctor to the island.

b. Medical.

First Aid and routine treatment should be accomplished at the station site without reference to or dependence upon the Air Force dispensary. An Air Force doctor visits the island about every three months for approximately seven days to perform routine inspection of

facilities and give opportune examinations and consultations. Coast Guard personnel are permitted to see the doctor when he is available. Air Force officials have indicated that this convenience should not be depended upon in the future, particularly in view of Air Force plans to totally withdraw from the island.

c. Dental.

Personnel assigned to this station must have all required dental work accomplished prior to reporting for duty. A dentist visits Iwo Jima every two months for about seven days to perform routine care for Air Force personnel. Coast Guard personnel are also given the opportunity for examination and care, but this convenience should not be regularly depended upon in the future.

d. Emergency.

In support of Air Force operations on Iwo Jima, the island is currently served by the 9th Air Evacuation Squadron, USAF, Tachikawa Air Base, Japan. Evacuations are accomplished with specially equipped C-54 aircraft. If a medical emergency arises which requires evacuation, Iwo Jima attempts to call any aircraft transiting the area for possible assistance; if this is unsuccessful, the 9th Air Evacuation Squadron is called. Evacuation to either Guam or Tokyo is practicable; difference in flying times is negligible, but it is recommended that any Coast Guard medical emergency cases requiring hospitalization be evacuated by Coast Guard or other government aircraft to Guam.

3. Pay and Other Records.

It is recommended that station personnel be paid in cash from Guam by Commander, Marianas Section. The Loran Station Commanding Officer should maintain personnel and health records.

4. Dependents.

Iwo Jima is not recommended as a dependent station.

5. Mail.

Mail should be delivered to the station from Guam by Coast Guard aircraft on regularly scheduled logistics flights. An FPO (Guam) address should be used.

6. Vehicular and Water Transportation Required.

a. General.

No boats are recommended. Due to a lack of harbors and sheltered waters, and because of maintenance and beaching problems, the boat would be an excessive burden to care for and operate. As long as the

Air Force continues to operate the Iwo Jima Air Base, adequate crash and fire equipment will be available and not necessary for the Coast Guard to furnish. Cargo handling at beach landings will not require any special vehicles other than 4-wheel drive capability.

(1) Type and Number.

- 1 - 2½ ton truck, 4-wheel drive with winch.
- 1 - ¾ ton Weapons Carrier, 4-wheel drive
- 1 - ½ ton Pickup Truck
- 4 - Bicycles

It is recommended that all vehicles be U. S. manufactured. Military specifications are desirable. Atmospheric conditions on Iwo Jima are highly corrosive, and rapid deterioration is a constant problem.

(2) Spares Required.

A six month supply of spare parts is recommended for those items which are not readily available at the general area support point.

7. Environment.

a. Settlements Nearby.

Besides the Coast Guard Loran-A Station now on Iwo Jima, the only other "settlement" on the island is a U. S. Military installation - IWO JIMA AIR BASE. Manned by an Air Force Captain and 50 enlisted men, the mission of the base is to provide navigational aid and emergency landing facilities for aircraft on the Guam/Tokyo route. The base real estate consists of 5,057 acres with the major portion of it devoted to the airstrip, taxiway and aircraft parking, and the station buildings. Miscellaneous communication sites, a weather observation station and a classified weapons storage area are also located on the base. Five civilians are employed by the Air Force on Iwo Jima; one is an electronic and communication specialist and the others operate the base power plant which is contracted out at the cost of \$49,000.00 per year. The contract includes only operation and emergency repairs; spare parts and overhaul of equipment is all extra. Air Force officials have reported that the Iwo Jima Air Base has been progressively reduced in complement, mission and operations. Further indications are that this reduction will continue until the Air Force completely phases out of operation on Iwo Jima in the near future. When this happens, all current Air Force logistic support to the island will be terminated. At this time, such problems as AVGAS, diesel and MOGAS Supply, aircraft fueling, airfield maintenance, provision of fire and crash equipment, weather reporting and the air communication station will become a problem of the ultimate users of these services and facilities.

b. Population Types.

Caucasian.

c. Language.

English.

8. Local Restrictions.

a. Contacts With Local Population..

As prescribed by the Air Base Commander in his station directives; this includes conduct while on base, use of Air Force recreation facilities and uniform of the day.

b. Customs.

Usual military etiquette and procedures.

9. Recreation.

a. On Station:

Recreation facilities provided on station should include a combination basketball, volleyball and tennis court, 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.

The Air Force Base facilities available for Coast Guard use include a small Exchange Store, golf driving range, swimming pool, bowling alley, library, gymnasium and baseball field. The swimming pool is only open from June through September. There is limited ocean bathing in certain areas. Swimming has limited appeal and skin diving is not actively pursued. There are no reefs for shell collecting. Hiking and photography is popular; some of the island scenery is quite interesting. Beachcombing is popular to search for numerous glass "fishing balls" washed ashore. Some surf fishing is carried on.

c. Limitations.

Personnel are forbidden to probe into caves and burial areas on the island resulting from the Japanese occupation up to World War II and subsequent hostilities. A small boat for recreation is not recommended because of a lack of protected water to operate in.

d. Precautions Required.

Protected waters for swimming are limited, and care must be exercised. There is still considerable unexploded ordnance throughout the island. Ordnance disposal units regularly visit the island to inactivate any ammunition and explosives discovered. Care must be exercised when wandering off the roads and paths to avoid any contact with unexploded ordnance, hidden cave or tunnel openings of Japanese fortifications, and the numerous volcanic vents emitting hot sulfuric vapor and steam.

e. Uniforms.

Standard uniform allowance is recommended with an emphasis on tropical type clothing. During winter months, the temperature has dropped as low as 46° F; accordingly, a certain amount of warm clothing is needed.

10. Health Conditions.

a. Endemic Diseases.

Endemic diseases are not evident and are no problem at Iwo Jima. General complaints consist mostly of sore throats, minor colds, ear infections and miscellaneous skin irritations.

b. Precautions.

Personnel must be careful to avoid excessive exposure to the sun. The routine immunizations required for the Asiatic area are sufficient for this site.

11. Local Flora and Fauna.

a. General.

Iwo Jima, once scorched of most animal and plant life during World War II action, is recovering slowly. The only animals on the island besides domestic dogs are wild house cats and several varieties of rats which inhabit the bush. As long as the cats retain their traditional taste for rodents, some natural balance may be expected. Scorpions and centipedes are present, but the bites from either, though painful, have never been fatal. Flies and mosquitoes abound but are reported as not being any control problem. Numerous varieties and sizes of cockroaches infest the island and permeate human activity. Vegetation consists of dense growths of young Haolekoa trees which have spread like weeds. The growth does not exceed 30 feet in height at present. A limited amount of other vegetation can be found such as Pandanus, Banyan, Scaviola, Sisal, Coconut, wild pineapple, Papaya and Banana. It appears that some of the flora represented was imported for special use at some time in the past. Fumes from volcanic vents have inhibited major growth in some areas. The soil of volcanic ash and sand in other areas is so poor that only high grass and Scaviola bushes will grow.

b. Special Problems for Station Personnel.

Cockroaches appear to be the major problem for station personnel. New and different types of insecticides must be kept in use to prevent the various strains from developing immunity. The roaches range in size from tiny to monstrous, and they all exhibit excellent resistance to man and his efforts to exterminate them. Hence, the action against them has been defensive and pointed to keep them under control.

12. Morale.

Morale on the present Loran-A Station appears good, and it is not expected to change. The warm and sunny climate is conducive to outdoor activity, there is adequate opportunity for off-duty diversion.

13. Berthing and Messing.

Berthing and messing will have to be a station function.

F. Logistics:

1. Transportation of Supplies.

a. United States to General Locality.

Guam is the recommended general area support point for logistics. While the Tokyo, Japan, area can be used, it has certain undesirable features of cost and control which are better satisfied at Guam. Further comments on logistics are expanded in Section K. MATS and MSTS can be used to either Guam or Tokyo area.

Freight Costs to Guam

MATS, Travis to Guam - .393/lb.

MSTS, Oakland to Guam - 23.50/measurement ton

Freight Costs to Tokyo Area

MATS, Travis to Tachikawa - .427/lb.

MSTS, Oakland to Yokohama - 23.50/measurement ton

b. General Locality to Site.

Government aircraft and ship from Guam is recommended.

c. Emergency.

Government aircraft from Guam is recommended.

2. Air Support.

a. Existing Airfields on or near the Site.

(1) Name of Field; Owners and Operators.

IWO JIMA. The airfield is operated and maintained by the U. S. Air Force, 6361st Air Base Squadron, Fifth Air Force.

(2) Runway Details.

Number of Runways	- 1
Length of Runway	- 9,265 ft.
Width of Runway	- 200 ft.
Surface	- Asphaltic Concrete Paving
Elevation	- 353 ft.
Orientation	- 07-25
Restrictions	- Hazardous to pure jet operations because of blown sand on runway.

(3) Hangars and Repair Facilities Available.

None.

(4) Fuel Facilities.

JP4 and 115/145 octane fuel is presently available until stocks are exhausted. Aircraft are fueled from an F-6 Fuel Truck; this truck has been authorized by the Air Force for removal from the island since 1 July 1962 and to be replaced by a 600 gallon hand pump fuel trailer. See further comments in Section K.

(5) Crash and Fire Fighting Facilities Available.

In accordance with Air Force standards for this type of field operation. Major equipment consists of two crash and fire trucks.

(6) Night Operation Lights.

The airfield is fully equipped with boundary lights, runway lights, approach and obstruction lights; but the lights are illuminated upon request only, except for the Suribachi Yama obstruction light which is burned from sunset to sunrise.

(7) Navigational Aids.

(a) Approach.

There is no control tower available. Advisory service is available upon request on 243, 255.4 and 121.5 mcs, but the operator does not have a view of the airfield. TACAN, channel 35, "IWO", 7.5 to 10 kw, is available. A "homer" radio beacon "OX" on 360 kcs, 400 watts, 24 hour service, is also available.

(b) Landing.

None.

(8) Present Operations at the Field.

(a) Type of Operation.

Landing facility for military logistics aircraft supplying the Air Force Base, Coast Guard Station and Chi-Chi Jima Naval Facility. Refueling service as long as the present stock of AVGAS lasts. Occasional emergency landing for aircraft on Wake/Okinawa and Guam/Japan routes. Peak air traffic through the field has been as high as 18 planes per month.

(b) Type of Aircraft Using the Field.

C-124	C-54	C-130	C-133	UF2G
C-123	C-47	C-121	C-118	

(9) Weather Forecasting Facilities.

None. Detachment #12, 1st Weather Wing, USAF, maintains a nine man observation station as a part of the Air Force facility on Iwo Jima, but this station has no forecasting authority.

(10) Control Tower.

None. There is no radar and no approach control.

(11) Clearances.

All flight clearances must be obtained from Guam or Tachikawa.

(12) Maintenance Aspects.

By Air Force standards, the airstrip is considered in poor condition. Current maintenance being carried on consists of emergency repair, and no funds are currently budgeted for general repair or upkeep; this action is largely credited to the fact that PACAF is uncertain and undecided over the scope of future use and operation of the Iwo Jima facility. In the meantime, the mission and operations of the Air Base are definitely being phased down. Under present repair conditions, Air Force officials feel that the runway will be unusable within 1 to 1½ years. The Coast Guard Site Survey Party had no persons qualified to critically examine the airstrip, but in comparison with other airstrips the Coast Guard is known to be operating out of, the Iwo Jima strip appears excellent.

(13) Access to the Airfield.

(a) Roads.

Existing roads are in good condition and furnish excellent access to the airstrip. Some new road building may be necessary to join the selected site to the existing roads, but the extent of the new road construction would be minor.

(b) Buses.

None. Station vehicles must supply all transportation to and from the airstrip.

(c) Railroads.

None.

b. Is the Airstrip Needed for Support?

Yes, the airstrip is needed for support. The isolation of Iwo Jima from shipping lanes and supply points as well as a lack of harbors and protected waters dictate regular air logistic support for the station.

3. Communications.

This station should be provided with the standard communications equipment and installation designed for similar Loran-C stations. There will probably be a requirement for communicating with COMARSEC as support commander as well as COMFESEC as operational commander. Air/ground frequency capability is not considered necessary as long as Iwo Jima Air Base continues operation. Likewise, no SAR frequencies are considered necessary. Depending upon the surface

logistic support carriers ultimately utilized, there may be a requirement for communicating with MSTs, Navy and/or Coast Guard ships. A telephone line linking the Loran Station with the Air Base will be required. Continued operation of the LORSTA Iwo Jima amateur radio station is recommended with the same equipment now in use.

The Iwo Jima Air Base communications station is run by Detachment #1, 1956th Communications Group, Fuchu Station, Japan; and it consists of 18 operators and technicians. All communications is by either voice or radio-teletype; no CW is employed.

4. Food.

There is no food available locally. All foodstuffs must be imported by air and surface support units. Assuming bi-weekly air support of this site, a one months cold storage capacity is considered adequate.

G. Meteorology.

1. Climate. (See attached Climatological Data; the following comments refer to the data furnished.)

a. General.

The climatological data furnished with this report is from actual observation on Iwo Jima. The climate of the island can be generally described as ranging from mild to hot with predominantly good weather and moderate rainfall.

b. Wind.

The prevailing wind direction is that direction from which the wind occurs most frequently. The mean annual wind direction and velocity for Iwo Jima is E at 10 knots.

c. Temperature.

Absolute maximum and minimum temperatures are the highest and lowest values recorded during the period of operation of the observatory. Mean daily maximum and minimum temperatures are the most reliable for planning purposes. Maximum temperatures will normally occur around 1300 to 1400 LST, and minimum temperatures shortly before sunrise.

d. Precipitation.

Precipitation amounts are furnished in inches of liquid. The maximum 24-hour precipitation total is the greatest rainfall recorded during a continuous 24-hour period beginning with the first hour of the day; these precipitation amounts frequently exceed the mean total for the month, particularly during the typhoon season.

e. Visibility, Sky Coverage and Flying Weather.

Flying weather is expressed as the percent of hourly observations exceeding or falling below specified values of visibility and ceiling respectively. Ceilings are defined as the lowest level where 6/10 or more cloud cover exists. The various limits are:

Closed: Ceiling less than 500' and/or visibility less than 1 mile.

Instrument: Ceiling 500', but less than 1000', with visibility equal to or greater than 1 mile; or visibility equal to or greater than 1 mile, but less than three miles with ceiling equal to or greater than 500'.

Contact: Ceiling equal to or greater than 1000' with visibility equal to or greater than 3 miles.

2. Availability of Weather Forecasts and Warning Service.

There is no forecasting or warning service available at Iwo Jima. All weather services must come from Guam and Tachikawa.

3. Special Considerations.

a. Local Land Conditions.

Iwo Jima terrain is flat for meteorological considerations. Neither the land nor the vegetation produce any unusual effect in wind direction or other meteorological phenomenon.

b. Harbor Facilities Affected by Weather.

There are no harbors at Iwo Jima; all coast line is open and exposed. However, the western shoreline is probably the most protected under mean conditions of wind and any associated wind driven seas.

c. Severe Conditions.

Highest wind conditions come during typhoon season. Iwo Jima is prone to threat of typhoon and tropical storm. The station structures will have to be built to withstand high wind and heavy wind driven rain.

d. Unusual Conditions Prevailing.

Rain must be collected by catchment as there is no other source of water fit for use on the island. Drought has been experienced because of erratic rainfall and insufficient storage facilities at the Loran-A Station on Iwo Jima. See further comments in Section K.

H. Oceanography.

1. Tide.

The mean high water interval at Iwo Jima is 7 hours 6 minutes. Springs rise 3 feet; neaps 2¼ feet.

2. Current.

Currents are tidal in character and are free from the influence of ocean current. These tidal currents are westerly on the rising tide and easterly on the falling tide, and they run within an hour after high and low water at an average of about 1½ knots.

3. Seasonal Changes.

None.

4. Shore Conditions.

Contour of the coast line is reported to have affect on the tidal current and cause irregularity in set and drift.

5. Off Shore Conditions.

Approximately 1000 yards off shore, open sea conditions prevail.

I. Hydrography.

1. General Information From Charts, Sailing Directions and Other Sources.

Existing sailing directions and charts are useful and essentially correct, but they have not been precisely kept up to date with existing conditions.

Most of the Iwo Jima coast line is characterized by rugged cliffs and rocks except for the beaches on the southwest end of the island. There is very little shoal water around the island. The limited "reef" is volcanically formed and bears no resemblance to coral reef structure.

2. Anchorages.

Any of the "swept areas" indicated on H.O. Chart 6101 are considered safe for anchoring. The most protected anchorage is probably south of Kama Rocks off the west beach. Anchorage bottoms consist of steeply sloping fine volcanic sand; vessels can expect to drag in winds of force 5 or more.

3. Approaches.

Approaches may be made, with caution, to the beaches or anchorages from the west and south. Except under good conditions, the waters bounded by Kama Rocks, Kangoku Rocks and the island offer limited area to navigate or hold ground, and due respect should be given to the tidal currents indicated on H.O. Chart 6101. A spot for an LST landing at the southern end of the west beach is marked by a framework beacon tower; this beacon is not marked on H.O. Chart 6101 but it can be easily sighted. The Air Force reports that successful surface support from LST's has been received at this landing; however, the landing has not been used for several years. Sounding plans of the LST landing area are attached to this report.

4. Charts Available.

H.O. Chart 6101 - "IWO JIMA". This chart is considered adequate for use by Mariners. The predominant landmarks shown will give good lines of position from any point around the island. The shoal waters are well sounded.

5. Mooring Buoys.

The mooring buoys shown on H.O. Chart 6101 off the west beach are reported reliable for use. These buoys are principally used by tankers bringing fuel products to the island, and they are an integral part of fuel off-loading system employed.

6. Boat Landings.

LCVP's and LCM's can land on either the west or south beaches depending upon the wind and sea conditions prevailing, but the south coast beach is characteristically steep compared to the west beach. Off the west beach a series of various type landing craft and barges have been deliberately wrecked to form a small boat landing basin of sheltered water; this basin is indicated on H.O. Chart 6101 in general terms, but the individual wrecks are not shown. Small boats can easily navigate through the entrance and proceed to the gentle slope of the sand beach for off-loading; the only kind of boats recommended for beach landings is flat-bottomed, ramp loading type. Roads close by provide access to the beach landings, and 4-wheel drive vehicles can drive nearly to the waters edge. Although LST landings have been successfully made on both the west and south coast beaches, the LST landing mentioned in paragraph 3 is considered the best to use.

For any operations in the beach sand and off-loading heavy cargo and equipment, the use of steel landing mat is recommended. At least 3000 linear feet of surplus unused landing mat in good condition is now available on the island for Coast Guard salvage if desired.

The small boat basin indicated on H.O. Chart 6101 on the south central coast of the island is non-existent.

J. Recommended Station Complement. (Loran A-C Station)

1. Officers.

LT - 1

RELE - 1

Total Officers - 2

2. Enlisted Men.

BMC - 1

SN - 11

HM1 - 1

CS1 - 1

CS3 - 1

ETC - 1

ET1 - 2

ET2 - 3

ET3 - 4

RM2 - 1

ENC - 1

EN1 - 1

EN2 - 1

EN3 - 2

EM1 - 1

FN - 2

DC1 - 1

Total Enlisted - 35

3. Indigenous Labor.

None available.

K. General Comment and Recommendations:

1. Volcanic Aspects of IWO JIMA

Iwo Jima is reported to be a dormant volcano, and as such, it may erupt at any time with serious damage or loss of life and property. The main occupied part of the island has not erupted for probably several hundred years, and it is estimated that the island may not erupt for a long time in the future. Still, the numerous vents that emit hot sulfurous gases, hot ground areas, earth deformation and faulting, and an explosion in 1957 all indicate that volcanic activity of some sort is going on deep within the island. Personnel on the island testify to occasional earth tremors. Large and very active "sulfur pits" are impressive island scenery

as are the large earth cracks and faults. The possibility must be kept in mind that the island might seriously erupt at some unknown time. The present absence of seismic instruments on Iwo Jima prevents any meaningful prediction study. The construction of a costly installation on the island would appear to be pure calculated risk. And this risk is significant, considering that Iwo Jima will be the Master Station for the Northwest Pacific Loran-C Chain.

2. Existing Fuel Facilities.

A description of the existing fuel storage facilities on Iwo Jima, maintained by the Air Force, is as follows:

<u>Product</u>	<u>No. Tanks</u>	<u>Capacity, each</u>	<u>1961 Condition</u>
JP4 Fuel	1	10,000 BL	25 year life
AVGAS	1	10,000 BL	25 year life
DIESEL	1	10,000 BL	25 year life
MOGAS	1	3,000 BL	25 year life

Construction Details (All Tanks)

Footings:	Concrete Wall
Framework:	Structural Steel
Exterior Walls:	Sheet Steel
Roof:	Sheet Steel

Bulk delivery is by tanker through a 6" floatable hose into an 8" steel pipe line on the west beach. Products delivered are separated by a "water slug" when pumped ashore. Mooring buoys are established several hundred yards off shore opposite the sealine to provide adequate holding while the tanker discharges fuel products. All fuel is trucked from the bulk tanks to various smaller storage tanks for ultimate use.

3. AVGAS Operating Stock.

Until recently, Iwo Jima has been a refueling station for aircraft requiring fuel in emergency or in routine flight. On 6 July 1962, CINCPACFLT notified COMNAVMARIANAS that the Air Force AVGAS resupply system on Iwo Jima would be inactivated at some early date, and that COMNAVMARIANAS comments were desired prior to making any recommendations to the Chief, Naval Operations. The sole air support for the Naval Facility, Chichi Jima, Bonin Islands, 125 miles north of Iwo Jima, is accomplished by Navy UF2G from Guam using Iwo Jima as a refueling stop. Navy requirements for 115/145 octane AVGAS for this operation are approximately 80,000 gallons per year. At the time of this survey, the final decisions of CINCPACFLT concerning the continued use of Iwo Jima as an aircraft refueling point in support of Chichi Jima are undetermined.

The refueling aspects of the Iwo Jima Air Base have already been withdrawn by the Air Force, and the F-6 fuel truck now on the island has been authorized for removal since 1 July 1962 to be replaced by a 600 gallon hand transfer pump fuel trailer. Current stocks of AVGAS and JP4 will be used until exhausted.

4. Diesel Fuel and MOGAS Operating Stock.

As long as the Air Force remains on Iwo Jima, indefinite as it may be, there will be a continuing need by that service for diesel fuel to operate the power plant and MOGAS to operate the base vehicles. The present storage tanks are available for Coast Guard use in any event. At present, the most convenient way to procure fuel is direct from the Air Force storage tanks on a "pay-as-we-use" basis, advising the 6100th Support Wing of our requirements. An alternate method would be to separately procure a fuel shipment, deliver it into the Air Force tanks, and draw it on a credited basis.

The recommended method to supply diesel fuel to the station site is by pipeline in order to eliminate the excessive man hours, equipment and maintenance consumed in manual transfer by truck or trailer. A one-month supply diesel storage tank at the terminal (station end) of the pipeline would be sufficient. Due to the distance involved between the storage tanks and the site, a fuel pumping station is considered necessary.

Until such time as the Air Force may completely withdraw from Iwo Jima, it is recommended that the Coast Guard conform with the current Air Force method of fuel products procurement from the U. S. Army, Quartermaster Corps, Camp Zama, Japan, through the Japan Sub-Area Petroleum Office. Iwo Jima is actually a responsibility of the Guam Sub-Area Petroleum Office. In event the Air Force abandons Iwo Jima, fuel requirements should be placed upon the Pacific Area Joint Services Petroleum Office, Pearl Harbor, Hawaii.

5. Logistics.

Two logistic support points - Guam and Tokyo - are sufficiently near Iwo Jima to include comment on both. The following table outlines the most feasible logistic sources or coordinators that each of the two general area support points can give:

<u>Support Requirement</u>	<u>Guam</u>	<u>Tokyo</u>
Air Support Unit	CGAIRDET Guam and limited Navy UF2G	WESTPAC Transportation Office, CINCPAC, Tachikawa Air Base
Surface Support Unit	Transient CG Tender and monthly Navy AKL	Transient CG Tender
Personnel	COMARSEC	COMFESEC
Commissary	NSD, Guam	6100th Support Wing, USAF, Tachikawa Air Base, Japan
GSK	NSD, Guam	NSD, Yokosuka
Electronics	NSD, Guam & CG Supply	NSD, Yokosuka & CG Supply
Misc. Spares & Parts peculiar	COMARSEC & CCGD14	COMFESEC & CCGD14

<u>Support Requirement</u>	<u>Guam</u>	<u>Tokyo</u>
Fuel	NSD, Guam or US Army, Camp Zama, Japan	US Army, Camp Zama
Clothing Small Stores	NSD, Guam	NSD, Yokosuka
Medical Stores	NSD, Guam	NSD, Yokosuka
Movies	NAVSTA, Guam	Fleet Act. Yokosuka
Exchange Store	NAVSTA, Guam	FE Exchange Service
Pay	COMARSEC (\$)	5th Air Force (\$)
Mail	FPO	APO
Morale	COMARSEC & CCGD14	COMFESEC & CCGD14
Emergency Air Evacuation	CGAIRDET, Guam	9th Air Evac Sqdn, USAF Tachikawa
Medical Relief	Naval Hosp. Guam	Tachikawa AF Hosp.

Even though Iwo Jima will be operationally paired to other stations, administered and supported by COMFESEC, and recognizing the fact that there is, at present, satisfactory logistic support being furnished to the island by the Air Force, Guam is still recommended as the preferable general area support point for the Iwo Jima site. Current support of the Iwo Jima Loran-A station utilizing the Air Force out of the Tokyo area has been handicapped by extensive dependence upon cross-service agreements, uncertain cargo capacities and schedules offered by the carriers, and a significant physical distance of the COMFESEC office from the various support sources. With the prospect of eventual withdrawal of the Air Force from Iwo Jima, alternate methods of support must be considered. While the importance of the Loran-C program carries sufficient weight to anticipate a priority assistance from CINCPAC should other negotiations from general area service support forces fail, the resupply of a station should be arranged through the most direct and practical channels. Guam is considered to have better solutions to support problems than Japan.

Although Iwo Jima is very nearly equidistant from Tokyo or Guam, the island is located within the Marianas Section. From Guam, air and surface support could be furnished by established Coast Guard Commands, and the reliance upon other services for administrative and transportation requirements could be minimized. MATS costs to Guam are cheaper than they are to Tokyo. Flying conditions out of Guam over the span of a year are far superior to those out of Japan. One of the most desirable features of Guam is that it is a U. S. territory and U. S. Forces base of operations which is permanent and free of the current vicissitudes of the U. S. Forces status in Japan; this is an important aspect to the problem of dependable and regular logistic support units and carriers.

The Marcus Island Site Survey Report pointed out in detail the advisability of supporting that station from Guam. Supporting Marcus Island from Guam will necessitate a buildup of COMARSEC organization. This build-up is even more justified by having a second station to support, because the support characteristics for both stations have similar demands. Again, satisfactory solutions are required to such problems as what type of aircraft will be employed, AVGAS refueling requirements, and the increased number of personnel and facilities required. Since the concept of support from Guam is already covered in detail in the Marcus Island Site Survey Report, there is no further need to restate it.

In conclusion, it is recommended that logistic and administrative support for Iwo Jima be assigned to COMARSEC at Guam. With the increased support responsibilities being brought about by the Iwo Jima and Marcus Island Stations, it is considered desirable to consolidate them in an area, when possible, where they can be best handled by Coast Guard operating units with a minimum amount of effort.

6. Water Supply.

A combination of erratic rainfall and insufficient storage facilities has caused severe water shortages at the existing Loran-A station. Care must be taken during new construction to furnish adequate catchment area and a generous storage capacity. In the climate experienced at Iwo Jima, water consumption can be expected to be high for normal health and comfort. It is considered impractical to draw upon the Air Base water supply on a regular basis, but this could be used as an excellent back-up source. Further comments and details are furnished in the Civil Engineer Report.

CLIMATOLOGICAL DATA - IWO JIMA

ELEMENT/MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Temperature (°F)													
Absolute Maximum	81	79	87	85	89	91	93	89	89	87	85	83	93
Mean Daily Maximum	70.9	71.1	73.5	76.8	80.7	84.6	85.7	84.9	85.2	83.4	79.6	74.4	79.3
Mean	67.4	67.1	69.4	72.6	76.6	80.7	81.7	81.2	81.4	79.7	76.1	71.0	75.4
Mean Daily Minimum	63.7	63.0	65.1	68.3	72.5	76.7	77.7	77.4	77.6	75.8	72.7	67.6	71.5
Absolute Minimum	46	56	58	58	64	72	68	70	70	70	64	58	46
Mean Relative Humidity (%)	76	77	77	83	85	84	82	84	82	82	81	77	81
Precipitation													
Mean Precip. (In.)	2.76	2.50	2.15	3.69	5.27	3.79	7.19	6.04	4.48	4.93	4.88	4.13	51.81
Maximum 24-hr Precip (In.)	5.0	5.0	10.0	5.0	5.0	2.5	5.0	5.0	10.0	10.0	10.0	5.0	10.0
Mean No. of Days w/Precip.	10	9	8	10	12	10	17	16	13	16	13	11	145
Mean Cloud Cover (%)	62	58	56	62	62	55	64	66	59	56	61	61	60
Flying Weather (%)													
Closed	2.6	1.3	1.3	6.2	8.3	1.8	0.5	1.0	1.2	0.7	1.7	1.2	2.4
Instrument	2.2	2.2	2.9	7.7	4.6	3.2	1.7	3.3	1.8	2.6	3.4	4.1	3.3
Contact	95.2	96.5	95.8	86.0	87.2	95.0	97.8	95.6	97.0	96.7	94.9	94.7	94.3
Surface Winds													
Prevailing Direction	N	N	NE	E	S	S	E	E	E	NE	NE	NNE	E
Mean Speed (Knots)	12	12	11	10	9	8	8	9	10	11	12	12	10

CLIMATOLOGICAL DATA

MAXIMUM WIND SPEEDS

TABLE I

These statistics represent the maximum one-minute-average wind speeds and the peak gusts at the surface and at the 1350 foot level for Iwo Jima. The speeds are expressed in terms of return periods from 1 to 20 years. A return period is the length of time, on the average, over which a certain speed will be exceeded once. For example, if a 100 knot wind has a return period of 10 years, over a long time period 100 knots will be exceeded an average of once every 10 years. The values presented are based on actual data and were computed using frequency distributions of extreme values, empirical relationships of gusts to steady winds and empirical relationships of the increase of wind speed with height.

<u>Return Period</u>	<u>Wind Speed in Knots</u>			
	<u>Surface</u>		<u>1350 feet</u>	
	<u>1 Minute</u>	<u>Peak</u>	<u>1 Minute</u>	<u>Peak</u>
1 year	60	85	77	95
2 years	67	95	86	107
5 years	110	146	141	169
10 years	138	175	177	205
20 years	160	188	205	228

TABLE II

These statistics represent the maximum recorded peak gusts at Iwo Jima for eleven years of record. The calculated values of Table I compare favorably with the observed values of this table and indicate that the statistical technique is reliable.

<u>January</u>	57 knots	<u>July</u>	92 knots
<u>February</u>	63 knots	<u>August</u>	95 knots
<u>March</u>	60 knots	<u>September</u>	201 knots
<u>April</u>	58 knots	<u>October</u>	160 knots
<u>May</u>	79 knots	<u>November</u>	72 knots
<u>June</u>	60 knots	<u>December</u>	90 knots

CLIMATOLOGICAL DATA

TYPHOONS

MONTHLY AND ANNUAL FREQUENCY OF TYPHOONS FROM 1947 THROUGH 1958 PASSING WITHIN 300 NAUTICAL MILES OF IWO JIMA.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1947					1			1	1	1	1		5
1948					1				2	1			4
1949									1				1
1950					1			2	2	1			6
1951												1	1
1952	1								1	1			3
1953							1	2		2		1	6
1954									3				3
1955							2	2	1	2		2	9
1956							1	1	2				4
1957									1	1	1		3
1958						3	2					1	6
Total	1	0	0	0	3	3	6	8	14	9	2	5	51

Fifty percent of all the above noted typhoons produced winds of fifty knots or more at Iwo Jima.

CLIMATOLOGICAL DATA

TYPHOONS

Typhoon LOUISE in September 1955, was the most severe typhoon that has ever been observed at Iwo Jima. The following is an extract from an account of the facts of the storm as recorded by the Commanding Officer, 6th Detachment, 15th Weather Squadron, USAF, on 29 October 1955:

"TYPHOON LOUISE"

1. Iwo Jima was 98% destroyed by typhoon LOUISE on 25 September 1955.
2. The following severe weather warnings were issued:
 - a. Condition III was issued at 24115K.
 - b. Condition II at 241300K. The warning increased winds gradually after 242200K to 25 knots with gusts to 40 knots by 250400K and to 40 knots with gusts to 50 knots by 251200K.
 - c. Condition I at 242130K. Winds gradually increasing to 45-50 knots with gusts to 95 knots by 250800K.
 - d. Another warning was issued to Base Commander at 251020K of winds to 75 knots with gusts to 95 knots.
3. The winds gradually increased and by 1245K were 95 knots with gusts to 122 knots. Although it was expected to diminish at any time, the winds continued to increase and the wind equipment was blown down at 130 knots. Wind was later estimated at 150 knots (172 mph) with gusts to 180 knots (207mph).
4. The wind started to abate in the eye at approximately 1500K to 40 knots with gusts to 60 knots.
5. The winds started to increase again after the eye passed and was estimated to be approximately 120 knots by 1830K. The wind started abating at 260300K and had dropped to 25 knots by 260900K.
6. The typhoon turned westward instead of moving north or northeastward. The island was hit by the northeast quadrant of the typhoon instead of the western quadrant. The northeast quadrant of a typhoon is the most destructive.
7. The island received 11.4" of rain over a 24 hour period during the passing of the typhoon."

IWO JIMA

SITE SURVEY REPORT

ELECTRONICS ENGINEERING REPORT

SITE 2-A IWO JIMA

ELECTRONICS SITE SURVEY REPORT

A. PAIRED STATIONS

1. Site II-A, designated MASTER for the NORTHWEST PACIFIC LORAN-C CHAIN, is proposed for the Island of IWO JIMA (OGASAWARA GUNTO-BONIN ISLANDS).

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

<u>TO</u>	<u>DISTANCE N.M.</u>	<u>GCB</u>
a. SITE I, X-Ray Slave, Tokachibuto, Hokkaido, Japan	1053	3°20'
b. SITE III, YANKEE Slave, Marcus Is., No. Pacific Ocean	691	89°
c. SITE IV, ZULU Slave, Gesashi, Okinawa	728	280°21'
d. SYSTEM AREA MONITOR (SAM), Oshima Is., Japan	598	350°05'

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

B. CALCULATED SIGNAL STRENGTHS

1. The calculated ground wave field intensity at IWO JIMA, from X, Y, Z slaves, is as follows:

a. From SITE I, based on a sampling point radiated power of 100KW, and an overwater path of 1053 N.M., 100 uv/m (+40db uv/m).

b. From SITE III, based on 750KW radiated (sampling point power) and a sea water path of 691 N.M., 1320 uv/m (+63db uv/m).

c. From SITE IV, based on 100 KW radiated and a sea water path of 728 N.M., 446 uv/m (+53db uv/m).

2. The calculated ground wave field intensity at the SLAVES, based on 750 KW radiated from IWO JIMA, is as follows:

a. At SITE I, 274 uv/m (+49db uv/m).

b. At SITE III, 1370 uv/m (+63 db uv/m).

c. At SITE IV, 1220 uv/m (+61.5db uv/m).

C. SIGNAL TO NOISE RATIOS

1. A plot of predicted 100KC/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 median noise over the year is 36.6db above 1 uv/m (67.6 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 57db above 1 uv/m (708 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 field intensity measuring equipment was not available, therefore on site noise measurements were not made. However, in view of previous good correlation of measured/predicted data at other NORTH-WEST PACIFIC CHAIN sites, computed data is considered reliable and representative of actual conditions.

4. Based on the computed 95% reliability noise index of 57db, the following limiting S/N ratios will apply at IWO JIMA, assuming all over water paths:

- a. From SITE I 1.0 to 7.0
- b. From SITE III 2.0 to 1.0
- c. From SITE IV 1.0 to 1.6

5. Assuming 750 KW radiated from IWO JIMA, the following S/N ratios will apply at the paired Slaves:

- a. SITE I, for a 95% reliability index of +52db uv/m (398 uv/m) 1.0 to 1.5
- b. SITE III, for a 95% reliability index of +54db uv/m (500 uv/m) 2.75 to 1.0
- c. SITE IV, for a 95% reliability index of 57db uv/m (710 uv/m) 1.7 to 1.0

D. PROPAGATION CONSIDERATIONS

1. The proposed site is located on a plateau, about 450 feet above sea level, directly south of, and adjoining the existing Loran-A facility on Iwo Jima. The Antenna ground plane area, planned for 3000' diameter, is essentially flat, within 1%-2% grade, over approximately 60% of its surface. The remainder of the area, in the northerly direction, is fairly rugged, and contains a number of ravines and sheer embankments. Average grades in this area, however, are estimated not to exceed 10%, and slope towards the Loran-A station, and the sea. No serious construction or propagation problems are envisioned.

2. Except for paved, unused, aircraft taxiways in the proposed location, the ground plane area is covered with generally dense vegetation and will require extensive clearing. "HAOLE KOA", and PANDANUS trees grow in dense thickets to eighteen foot heights. In the ravines, Chinese Banyan and KAMANI trees grow to thirty foot heights, and bananas thrive.

3. Ground conductivity data is not available, but in view of the volcanic nature of Iwo Jima, overland paths are considered "poor" soil propagation paths. However, the land mass of the entire island (maximum dimension 4.5 miles, maximum elevation 528 feet (MT. SURABACHI) is believed to be relatively minor for propagation considerations. On this basis, unobstructed over water takeoff is afforded to the entire service area.

E. INTERFERENCE CONSIDERATIONS

1. As mentioned earlier, an AN/URM-6, Field Intensity meter was not available, therefore no information is available concerning possible radiated interference to Loran-C operation at this site. The reader is referred to the Site Survey Reports for other NORTHWEST PACIFIC LORAN C SITES, submitted earlier, which contain tabulations of frequency products detected at those sites, through the range of 16-260 KC/S.

2. The nearest electronic-communications installation is the Loran-A station approximately 1/2 mile distant. Installed equipment includes double pulsed, low power Loran-A transmitters (Rates 2H5/2H6), two AN/FRT-23 600 watt (A-1) communications transmitters operating on assigned Coast Guard frequencies, and a 1 KW PEP SSB amateur Radio Station.

3. The AACS transmitter site, 2.5 miles distant, operates the following:

a. 4450 kc/s	2.5 kw	RTTY
b. 4765 kc/s	2.5 kw	RTTY
c. 5340 kc/s	2.5 kw	RTTY
d. 6951 kc/s	2.5 kw	RTTY
e. 7630 kc/s	2.5 kw	RTTY
f. 10,510 kc/s	2.5 kw	RTTY
g. 11,990 kc/s	2.5 kw	RTTY
h. 12,260 kc/s	2.5 kw	RTTY
i. 12,307 kc/s	2.5 kw	RTTY
j. 14,475 kc/s	1.0 kw	A-3
k. 20,737 kc/s	1.0 kw	A-3

4. Air-ground communications facilities, approximately one mile away, operate on:

a. 121.5 mc/s	100 watts
b. 243.0 mc/s	100 watts
c. 255.4 mc/s	100 watts

✓

5. The Island Armed Forces Radio Service (AFRS) broadcast station, 1.25 miles distant, operates with 250 watts on 1500 kc/s.

6. The Iwo Jima radio beacon, call sign OX, operates on 360 kc/s with 400 watts, and is located 2.5 miles away.

7. A TACAN installation operating on 996 mc/s (Channel 35) is located 1.75 miles distant, and the base amateur radio station, KG6IJ, with 1 KW PEP SSB, 1½ miles.

8. The AACSS receiver site is located in the Air Operations area, approximately 1.5 miles distant.

9. All island power and telephone circuits are above ground due to rapid deterioration of buried wiring by sulphur and volcanic activity. Nearest exposed power and telephone cables are within about ½ miles.

10. Harmful interference to or from Loran-C operation and the facilities discussed is considered unlikely. There is a possibility however that physical "interference" of the 1350' radiator may cause TACAN and radiobeacon errors due to re-radiation.

F. LORAN "A" CONSIDERATIONS

1. The proposed Loran "C" location was chosen so that the existing Loran "A" station could be retained and integrated into a Loran A-C complex with a minimum of modification and relocation. A suggested electronic plot plan is shown in enclosure (4).

2. While it is intended that the existing general antenna arrangement be retained, it is recommended that modernization of the facilities be effected as follows:

a. Replace the wire "Tee" type Loran transmitting antenna with a ¼ wave tower radiator to improve radiation efficiency from this vital station.

b. Replace existing pole supported COMB antennas with new fiber glass whip types. The condition of the COMB antennas was evaluated, and while the poles themselves are considered to be in fair to good condition, the cross arms and supporting alley arms are considered unsafe and dangerous for any servicing of the wire antenna or Manila antenna suspension system. A major rehabilitation program is indicated. Removal of all these poles and replacement with the fiber glass whip/encapsulated tuning unit types will eliminate costly pole and tuning unit maintenance and will be ideally suited for the typhoon conditions regularly experienced at Iwo Jima.

c. Replace existing pole supported emergency Loran receiving antenna with 35' whip type antenna, for reasons discussed in paragraph F2(b).

d. Install Loran amplifiers for high power operation to effect a service area S/N improvement.

e. Install output switching equipment, type AN/FPA-3A.

3. To effect maximum utilization of manpower and facilities, a combined Loran A-C signal/power building is proposed, supplanting the existing signal/power building. Transmission line loss in 1500 feet of RG-147/U coaxial cable from the Loran-A transmitting antenna to the new signal/power building will not exceed 0.6db. The loss is not considered significant.

4. In view of the well documented history at Iwo Jima of equipment deterioration and failure due to corrosive effects of volcanic gasses from nearby fissures, it is urged that all electronic equipment spaces be air conditioned, using filtered air, treated for removal of sulphurous gasses. It is recommended that, if available, new equipment, consisting of 4 each AN/FPN-30 timers, 2 each T-325 series Loran transmitters, 2 each AN/701 amplifiers, 1 each AN/FPA-2 and AN/FPA-3A equipments be provided for installation in the new signal/power building. Replacement equipment will simplify installation and eliminate possible extensive off-air time during the transition from old to new signal buildings. After completion of the operational transfer to the new facilities, the presently installed electronic equipment can be returned to an overhaul activity for overhaul and re-issue.

G. COMMUNICATIONS FACILITIES

1. Existing LorSta IWO JIMA, and Air Base communications facilities are covered in paragraph E. of this section of the SITE 2-A site survey report.

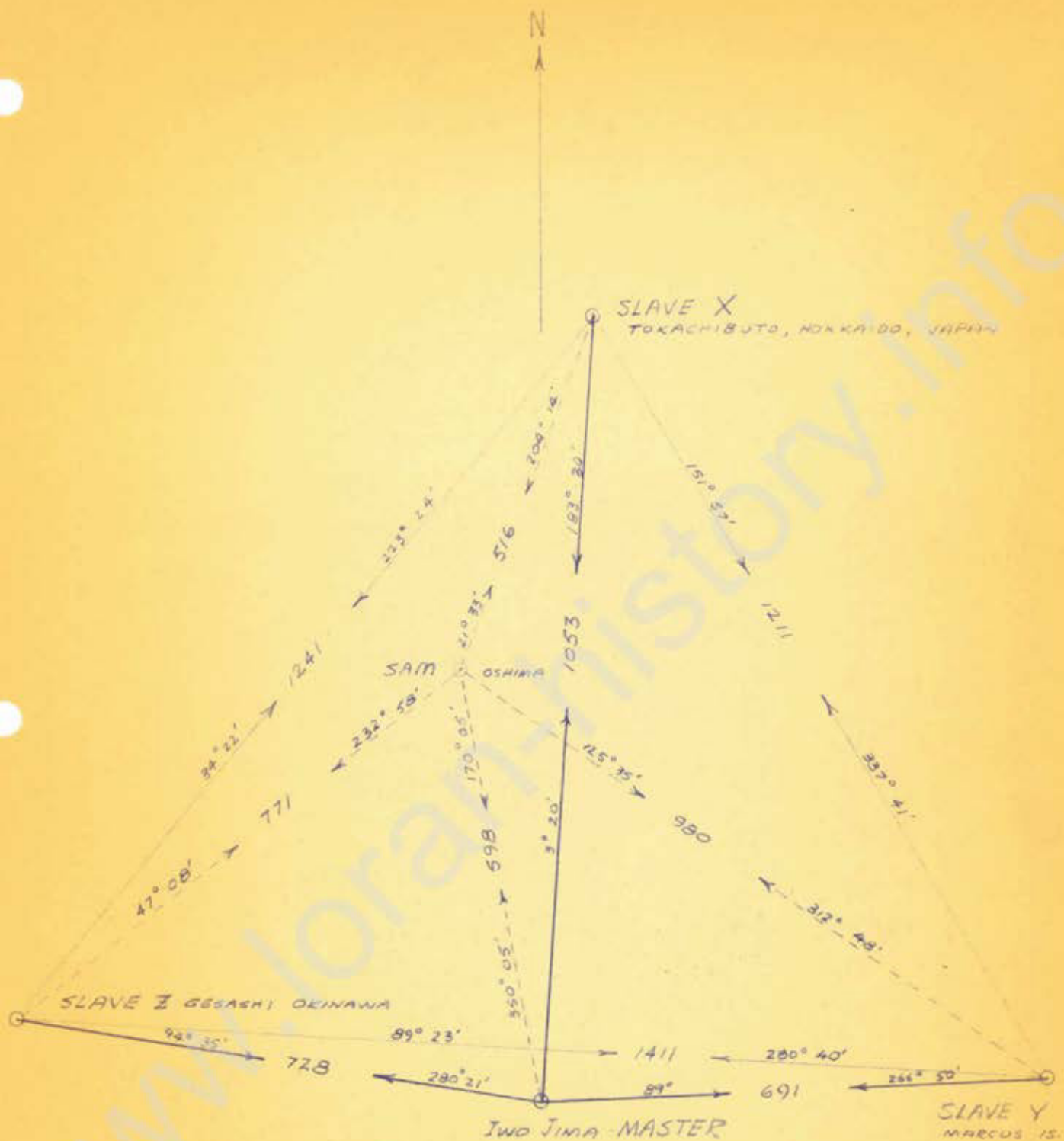
2. For communications with other stations of the NORTHWEST PACIFIC LORAN C CHAIN, radiotelephone and RTTY circuits will be required. Installation of the standard SSB, Loran-C station equipment complement is recommended, replacing the existing IWO JIMA AN/FRT-23 transmitters.

H. GENERAL

1. Based on 750 kw radiated at the sampling point, from IWO JIMA, and the S/N ratios at the paired slaves tabulated in paragraph C-5 of this report, satisfactory system synchronization is expected, assuming a 1:1 S/N synchronization criteria. Based on the same criteria, it is doubtful, however, that accurate full time monitoring can be accomplished at IWO JIMA, particularly of the M-X leg. Refer to the S/N ratio tabulation in paragraph C-4. During these times it may be necessary for SAM, Oshima, to assume control. For information, the following S/N ratios will apply at SAM, based on a 95% reliability noise index of 55db above 1 uv/m (562 uv/m):

- a. From SITE I for 100 kw radiated and 516 N.M. over water path, 2.0 to 1.0
- b. From SITE II, 598 N.M., and 750 kw radiated, 4.0 to 1.0
- c. From SITE III, 980 N.M., and 750 kw radiated, 1.0 to 1.5
- d. From SITE IV, 771 N.M., and 100 kw radiated, 1.0 to 1.6

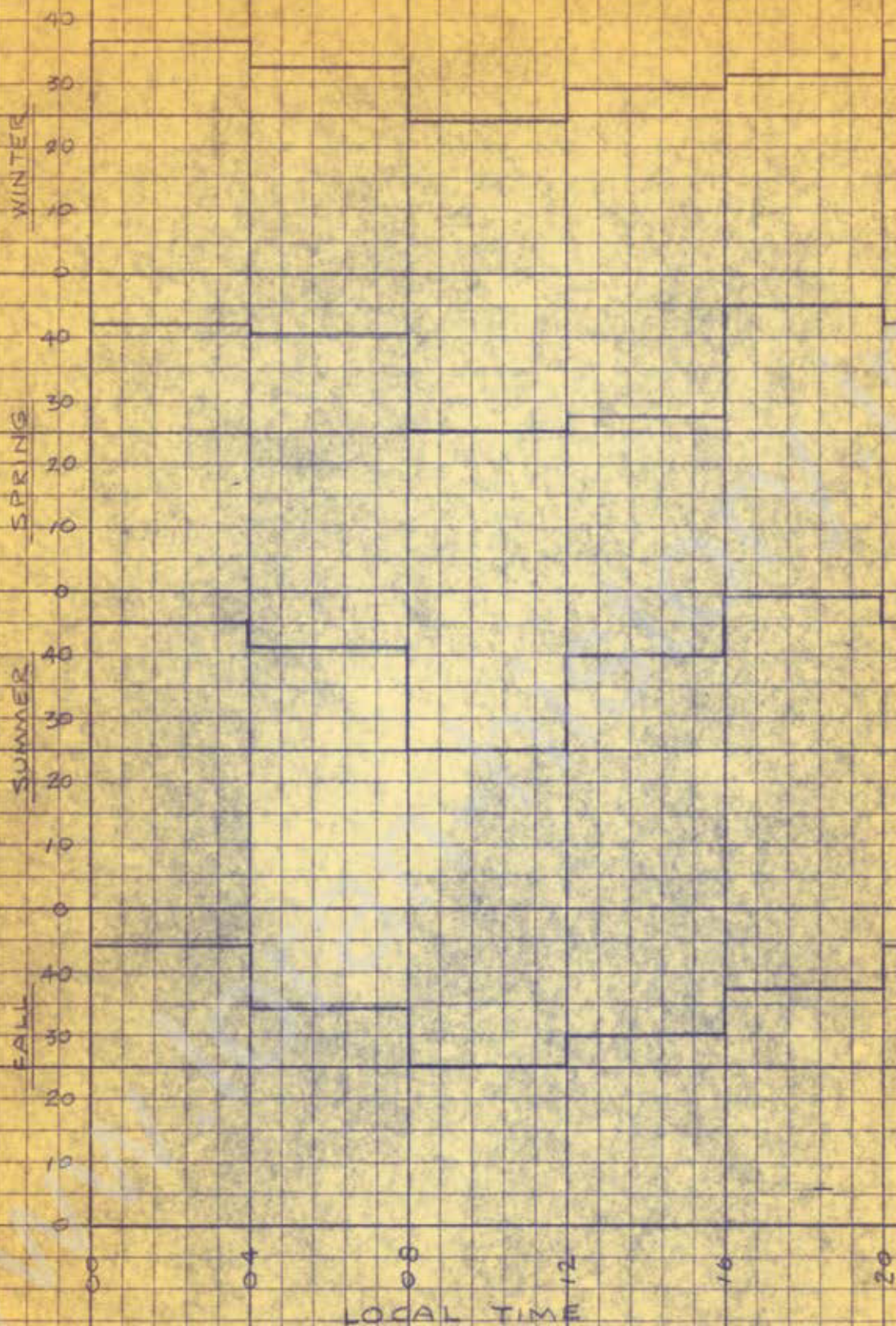
2. As mentioned earlier, equipment, antenna, and ground system deterioration due to volcanic activity is well documented. Solder connections literally disintegrate, leaving only a powdery residue. Copper antenna wires and ground system radials become badly pitted and sponge-like in a matter of months. At the present time, two Jima finds it necessary to replace the Loran-A transmitting "Tee" antenna every three months, on the average, due to rapid deterioration. Double dipped galvanized telephone/power pole fittings are relatively unaffected. Currently, all wire antennas, less Loran transmitting, are vinyl covered. The transmitting antenna ground system radials are also vinyl covered. Vinyl covered wire antennas have been in service for several years with excellent results. The vinyl covered ground system has only been installed for approximately one year, therefore a realistic evaluation may not yet be possible. However, on the basis of preliminary observations, and in view of the immunity of the plastic covered antenna wires to the corrosive atmosphere, it is recommended that the Loran-C antenna ground planes incorporate plastic covered conductors, that all ends and connections be sealed, and that connections be brazed, not soft soldered.



NORTH WEST PACIFIC LORAN "C" CHAIN
OVERALL SYSTEM DIAGRAM

SCALE 1" = 200 N.M.
DISTANCES IN N.M.

MEDIAN NOISE - RMS dB ABOVE 1 μV/m AT 100 KC/S - 25 KC/S BANDWIDTH



ANNUAL MEDIAN NOISE 37dB

IWO JIMA - SITE Z-A

PREDICTED MEDIAN NOISE
data based on GCIR report # 65

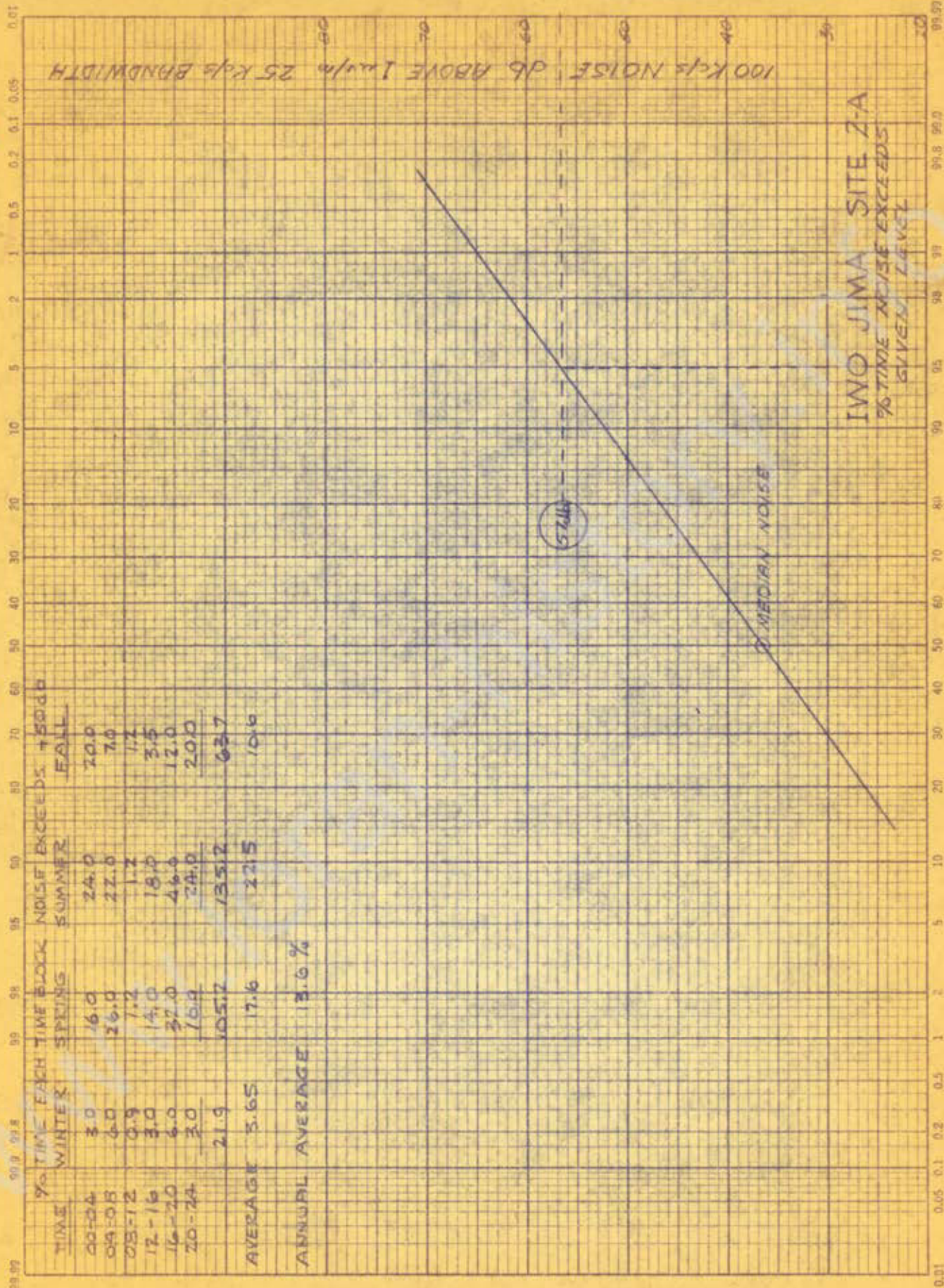
SITE 11-A (IMO JIMA)

PREDICTED MEDIAN NOISE LEVELS

(Ref. CCIR REPORT #65)

SEASON	TIME OF DAY	NOISE GRADE	RMS NOISE db ABOVE 1 UV/M	
			1 kc/s Bandwith	25 kc Bandwith
WINTER	00-04	65	23	37
	04-08	60	19	33
	08-12	25	10	24
	12-16	35	15	29
	16-20	57	18	32
	20-24	65	23	37
SPRING	00-04	73	29	43
	04-08	58	28	42
	08-12	28 ^{41/2}	11	25
	12-16	33	14	28
	16-20	62	31	45
	20-24	73	29	43
SUMMER	00-04	75	31	45
	04-08	58	28	42
	08-12	28	11	25
	12-16	54	26	40
	16-20	70	35	49
	20-24	75	31	45
FALL	00-04	74	30	44
	04-08	61	20	34
	08-12	28	11	25
	12-16	38	16	30
	16-20	65	23	37
	20-24	74	30	44

ANNUAL MEDIAN RMS NOISE 36.6 db (67.6 uv/m)



IWO JIMA

SITE SURVEY REPORT

CIVIL ENGINEERING REPORT

SITE II

SITE SURVEY REPORT

CIVIL ENGINEERING REPORT

A. SITE AND ANTENNA LOCATION:

(1) Local Name for Site:

IWO JIMA, Volcano Islands.

(2) Geographic Position of Loran Antenna:

$24^{\circ}48'13''N$ $141^{\circ}19'36''E$

(3) Antenna Location Monument:

Bronze disc marked "U. S. Coast Guard," set in concrete base; base is approximately 4" in diameter and projects 4" above the ground.

(4) Chart Showing Site Location:

Special map, AMS Series W811.

(5) Boundary Description:

No boundary description was prepared since the entire island is under U. S. jurisdiction. The area proposed for the installation is indicated on the enclosed map.

(6) Photographs:

Photographs are attached showing various features of the recommended site and features pertinent to the proposed installation. Descriptions are given on the back of each photograph.

(7) Aerial Photographs:

Selected aerial photographs made in 1958 are also enclosed.

B. CONDITIONS AFFECTING MOVEMENT OF GEAR TO ACTUAL SITE:

(1) Nearest Harbor or Anchorage:

There are no harbors on the island. The most used anchorage is on the west side of the island where four mooring buoys are located in water 20 to 30 fathoms deep. Another anchorage area, used when conditions are unfavorable on the western side, is on the southeastern side of the island.

(2) Beaches for Landing:

Beaches for landing are opposite the anchorage areas on the western and southeastern sides of the island. The western beach is best; it is a wide sandy beach, sloping upward to the road 1000 to 2000 feet inland. A paved road leads down close to the waters edge. Landings are made by LST, LCM and barge. The beach on the southeastern part of the island is steeper and has a poor road for access. The sand at both beaches is fine volcanic material, loose and not easily traversed by wheeled vehicles.

(3) Mobile Equipment Required:

Normal equipment required for grading and construction work such as bulldozers, cranes, concrete mixers, trucks and lowbed trailers, trenchers or back hoes, water tank trailers, rock crushers, sand and rock screening equipment, etc.

(4) Existing Transportation Facilities:

There are no existing transportation facilities available for contractor use. Several light trucks and jeeps are operated by Air Force and Coast Guard facilities on the island.

(5) Landing Craft Required:

If vessels are used, lightering of equipment and materials to shore is required and craft similar to LCM are recommended. If the contractor decides to transport equipment and material via towed barges, they can be moved near the beach for unloading.

(6) Availability of Stevedoring, Drayage and Local Labor:

There is no local labor available.

(7) Road Construction Necessary:

There is a paved road around the perimeter and several roads (some paved) criss-cross and lead to the interior of the island. In addition, many old runways and taxiways cover the central island plateau, one of which is very close to the site for the tower. This old runway is an excellent place for stacking and storing construction material for the tower and transmitter building. The perimeter road passes close to the general building site and an access road leads directly to the building site. Construction roads can be readily bulldozed by the contractor. Transportation of heavy equipment or heavily loaded vehicles across the main runway and taxiway will not be permitted.

(8) Air Transportation Facilities:

The 6100th Air Support Wing flies a C-124 airplane to IWO JIMA once each week carrying passengers and logistical supplies for the existing Air Force and Coast Guard installations. It is believed that a contractor will be able to arrange for air transportation of some personnel and a small amount of supplies but full logistic support of his operation will not be given. A contractor may be able to arrange for landing of his own air support at the field.

C. ACTUAL SITE CONDITIONS:

(1) Topography of Site:

The upper sections of the antenna zone is a flat smooth plateau which drops to the ocean in a series of terraces and slopes. Cliffs from 10 to 30 feet high exist at several points, and some projecting rocky towers and peaks are found on the general slope. In the lower section, seaward of the road, the existing loran station has been graded into a series of benches on which are located the buildings and antenna systems.

(2) Vegetation and Tree Cover:

The upper plateau is generally free of vegetation particularly where paved runways were developed. The slopes are heavily covered with dense brush consisting principally of HAOLE KOA, a slender tree not exceeding 20 feet in height. This brush prevents easy movement by personnel, but can be penetrated. It is easily uprooted and removed by light bulldozer equipment. Some banyan and other similar trees are scattered in this underbrush but they do not exceed about 30 feet in height.

(3) Ground Conditions and Geology of the Site:

IWO JIMA is a dormant volcanic island, the main portion of which has not erupted for several hundred years. An eruption in 1957 at the southern end was not classified as a true eruption but rather was in the nature of a steam explosion. There are numerous steam vents scattered over the entire island and a great number of hot spots are found, especially on the central plateau. Apparently some of the vents and hot spots change from time to time as cracks in the island structure permit gases to reach the surface. Numerous faults are found in the southern portion and several are found in the western portion of the island. These faults run generally from northeast to southwest, although two on the west side are parallel to the shore. Ground surfaces differ from a few inches to three feet at these fault lines. The vents discharge sulphurous steam and sulphur deposits are found at most of these points.

The northern part of the island is underlain by a firm tuff breccia intruded in places with lavas. The Japanese carved out underground cavities in the breccia during World War II.

The isthmus connecting Suribachi-yama with the main part of the island consists of beach sand covering the breccia and lavas.

(4) Earthwork Required:

Only minor grading will be required for the central 300-foot radius at the C-antenna. No grading will be required on that portion of the 1500-foot radius ground system lying on the plateau. Fairly heavy grading will be required on the slopes and terraces to break down the brows of cliffs and smooth out deep gulleys. Explosives will speed up grading on the cliffs but experience has shown that the balance of the grading can be accomplished by bulldozers, probably concurrently with clearing operations. Benches have been graded at the existing building site and only minor grading will be required to accomplish any required extension of these benches.

(5) Foundations for Structures, Engines, etc:

- a. No special foundations are anticipated to be required for engines or buildings. Soil borings are being obtained to provide the basis for design of these foundations.
- b. The tuff breccia upon which the Loran-C tower and anchors will be placed should present no special foundation problems. There is a possibility, however, that wartime excavations may exist under these locations. Foundation borings are being taken to determine the suitability of the material to support structures without corrective action. If hazardous cavities are found they can either be filled with concrete or supporting piling can be driven through them into suitable material.

(6) Termite Proofing:

Although no evidence of termite activity was found, it is recommended that construction be termite-proof type.

(7) Local Source of Construction Materials:

The only construction materials available locally are rock aggregate and sand. The only rock aggregate acceptable for concrete is lava; the sandy tuff breccia cannot be used for this purpose. A large supply of lava boulders of varying size is located northeast of Suribachi-yama, is

accessible by road, and has been used previously for construction on the island. The boulders will need to be crushed and the aggregate sized. Sand is found along the shore at many places. It too must be screened to provide proper sizes for the concrete and should be washed to remove the salt content. In the past, contractors have spread sand on unused sections of runway outside the Air Force catchment area and the salt has been leached out by rainfall.

(8) Pier or Wharf:

Construction of a pier or wharf is not recommended. The history of typhoons in this area coupled with faulting, earthquakes, and sandy materials make construction of a pier of doubtful value.

D. UTILITY REPORT:

(1) Potable Water Supply:

- a. The Air Force now has a 6" asbestos-cement line which leads to the storage area on the plateau. This water line is about 4,500' from the proposed loran building complex and the local Air Force Commander expressed the opinion that their water system has sufficient capacity to also supply the proposed Coast Guard station with potable water. However, in view of the probability that the Air Force may gradually reduce the size of its installation, it is not wise to place primary reliance on this source of water supply to the loran station. Instead, it is recommended that a rain catchment system be utilized, using roofs and a supplemental ground catchment area. Storage capacity more than double the present 70,000 gallon capacity is recommended. The existing station has experienced water shortages due to lack of storage capacity; much rainfall has been wasted because of inadequate capacity. It is recommended that the storage capacity be 200,000 gallons. It is also recommended that a two-inch water line, properly valved, be connected to the Air Force line at the storage area and extended to the loran station to provide a secondary source of supply. If the Air Force system cannot provide the required "back up" of supply, distillers can be later installed if it then becomes necessary. All potable water should be chlorinated.
- b. Water for concrete, mortar, etc., during construction can be obtained from two shallow ponds inside and south of the storage area. Rainwater ponded here is fresh but muddy and slightly bitter. It can be pumped and hauled to the construction site; potable water at the existing loran station is not available for construction purposes.

(2) Sewage Disposal:

The sewage system should include a treatment plant with effluent leading into a leaching field. Discharge of the effluent into the ocean is not considered practical because the line would exceed 1,000 feet in length. Likewise, discharge of the effluent into an open channel is not believed to be a desirable solution because of the probably annoying odors which would develop in this hot, humid climate.

(3) External Electric Power Supply:

There is no available external electric power supply.

(4) Garbage Disposal:

Garbage should be disposed of either by (1) dumping it into the ocean where currents will carry it out to sea, or (2) by burning the trash and burying the non-burnable garbage. Both methods are currently employed by the units on the island.

(5) Heating and Air Conditioning Requirements:

- a. Heating is not required.
- b. Air conditioning should be provided for the barracks, recreational space (see paragraph G(6)), and timer area. Extremely hot, humid conditions, especially in the summer make it difficult to sleep at night without air-conditioning, and watch-standers who must sleep in the daytime require air cooled by some method. Air conditioning the timer areas will make working conditions there acceptable and will assist in keeping the equipment cool. Of greater importance, however, is the value of providing filtered, drier air to the electronic equipment thereby reducing the adverse effect now created by sulphur fumes. At the present time the electronic equipment at the Loran-A station is kept operational only through excessive maintenance by station personnel. With larger and more complex equipment the maintenance workload due to sulphur corrosion, unless alleviated by air conditioning, may require an excessively large station complement.

E. CLIMATOLOGY AND SEA CONDITIONS

(1) Precipitation and Temperatures:

- a. There is a yearly mean of 143 days of rainfall, with an annual mean of 52 inches. May is the wettest, with a mean of 6.33 inches, and February the driest, with a mean of 1.85 inches. Most rain occurs during the period May through July.

- b. The yearly mean temperature is 80°F. July has a mean maximum temperature of 85° and February, a mean minimum temperature of 63°. Maximum and minimum recorded temperatures are 95° and 48°, respectively.

(2) Winds, Storms and Earthquakes:

- a. Prevailing winds are from the east and southeast.
- b. IWO JIMA is in the typhoon zone and has been severely damaged several times. Typhoon LOUISE in 1955 had steady winds estimated at 170 miles per hour and gusts estimated at 200 mph. Additional information on winds and storms is given in the operations section of this report.
- c. Earthquakes are frequent due to the volcanic nature of the island. Intensities have not been measured due to lack of equipment but they are undoubtedly severe. Existing masonry buildings have been designed to withstand earthquake loads and no cracking is evident. The new structures should be designed to withstand earthquake stresses.

(3) Atmospheric; Dust and Humidity Conditions:

- a. There is no unusual dust condition.
- b. The yearly mean relative humidity is 78%, varying from a mean of 67% in January to a mean of 83% in May and June. Mildew is a constant problem and adequate hot lockers should be provided for clothing and equipment.
- c. Steam and sulphur from vents throughout the island create a corrosion problem for equipment and material and a nuisance problem for personnel. Some of the larger vents are fairly stable in location but small ones are continually appearing and disappearing. This characteristic, combined with changes in wind direction, make it almost impossible to avoid these fumes. In general, however, the northwestern portion of the island is fairly free of these vents and fumes. Fume-proof (lead-free) paint should be used. In a test of several years duration at the Loran-A station, galvanized guy wire has held up best when exposed to corrosive fumes from a nearby sulphur vent.

(4) Sea Conditions Affecting Landings:

The exposed beaches on this island make them hazardous when wave action is critical. Storm- and typhoon-created waves, even long distances from generating areas, can cause unsafe landing conditions, even on the shores in the lee of prevailing winds. In general, the western beach is best for landings. More information on wave conditions and beaches is given in the operations section of this report.

(5) Construction Season:

Construction can be performed the entire year.

F. CONDITIONS AFFECTING CONSTRUCTION FORCE:

(1) Nearest Habitation:

The nearest areas which can provide construction support are Guam, Tokyo, and Okinawa.

(2) Endemic Diseases:

There are no endemic diseases on this island.

(3) Transportation, Communications, and Postal Facilities:

- a. The Air Force currently has one weekly flight from Tachikawa to Iwo Jima. It is believed that the contractor can arrange for transportation of personnel and small emergency supplies via these flights but delivery of construction equipment and materials, and logistic support should be arranged through other means. If the contractor plans to utilize his own air support, he should make prior arrangements with the Air Force for landings at Iwo Jima.
- b. The Air Force provides postal service to U. S. Post Offices in Japan and letter mail can be handled.
- c. Limited radio communications for matters related to construction operations can be processed to Tokyo by the present Coast Guard station.

(4) Construction Camp:

A construction camp can be set up at almost any point convenient for the contractor. Because of the limited potable water at the Ioran station, the contractor should plan to haul potable water from the Air Force system.

G. MISCELLANEOUS:

(1) Recommended Types of Construction:

Standard semi-tropical masonry structures are recommended, with adequate allowances in design for earthquake stresses. Existing buildings to be utilized should have concrete roofs added, either cast-in-place or pre-cast. Concrete water storage tanks are also recommended.

(2) Recommended Storage Requirements:

Water Storage - 200,000 gallons
Reefer and dry stores - 30 days

(3) Fuel Delivery and Storage:

The Air Force stores fuel oil in one 10,000-barrel tank at its fuel farm on the northwestern side of the island. Currently fuel oil is delivered to the Coast Guard station by a small Air Force tank truck but this vehicle may be removed from the island. It is recommended that fuel be delivered from the Air Force tank to the proposed storage tanks through a pipe line along the road. A booster pump may be required. Storage of 50,000 gallons of fuel, about one month's supply, is recommended at the station.

(4) Prospective Contractors:

Contractors in Japan

Shimizu Construction Company
Obayashi-Gumi Company
Taesei Construction Company
Kajima Company
Saito Kokyo Company
Kumagai-Gumi Company
Mishimitsu Construction Company
International Contractors

(5) Antenna Obstruction Lighting:

Obstruction lighting is required for the antenna towers and should comply with Air Force and FAA requirements.

(6) Existing Installation:

The existing Coast Guard buildings are in good condition but do not have the area required for equipment or personnel for the new station. It is recommended that they be retained, that new concrete roofs be added to them, and that they be used for vehicle storage, parts and supply storage, shops, transient quarters, and recreation. Inasmuch as transients will stay for short periods only, the present small rooms in the barracks, which are not large enough for station personnel under the latest criteria, can be retained for transient use. The galley and mess area can have partitions removed to provide a large recreation area for station personnel.

H. DRAWINGS AND SKETCHES:

Enclosed are the following:

- (1) Special Map AMS Series W 811 marked with recommended locations of structures.
- (2) Basic Layout Plan of Iwo Jima Air Base, Tab No. C-2.
- (3) Aerial photographs of the site.
- (4) Ground photographs of various pertinent features. (Descriptions are given on the backs of the photographs).

I. CONCLUSIONS:

It is concluded that a combined Loran A-C station can be installed on Iwo Jima at the location shown on the enclosed drawings.

IWO JIMA

SITE SURVEY REPORT

PHOTOGRAPHS