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## 15) INTRODUCTION

This study is an analysis of the major transportation facilities of South China and includes estimated tonnages that could be moved by military forces in a resupply operation.

South China, with a land area of about 942,000 square miles, is approximately the size of the United States east of the Mississippi River. The population is estimated to be 394 million (Jan. 1966), giving an overall density of 418 persons per square mile. Kiangsu Province, which includes most of the Yangtze delta, is the most densely populated with 1,196 persons per square mile, and in the Canton delta area the density of the rural population nearly equals that of some cities in the U.S. The total labor force of South China is 210.8 million.

More than two-thirds of South China consists of hills and mountains which extend from the coast to the western boundary of the region. The elevation of most of the hills and mountains is between 1,200 and 1,800 meters, but peaks of over 5,000 meters occur in the far west. The remaining one-third of South China consists of numerous valley and lowland plains that range from small isolated pockets in the interior and along the coast to broad expanses along large rivers in the northeast and south. These predominantly flat lowlands are intensively cultivated, chiefly in wetland rice. Most of the plains areas are drained by an intricate network of streams, canals, and irrigation ditches, but widespread flooding is common along major streams.

The climate is divided into a short summer season (June through August) with southerly winds and a long winter season (November through March) with northerly winds. Summers are wet, cloudy, and humid with temperatures varying according to elevation and latitude. Monthly precipitation amounts vary between 13 and 51 centimeters (5 to 20 inches) depending on location; coastal areas and southern slopes of rising terrain receive the greater amounts. Winters are normally dry, fairly clear and cool, and sometimes cold, but change to moist, cloudy, misty, and cool weather over the eastern highlands and lowlands in January. Monthly precipitation is usually less than 1 inch (2.54 centimeters) in the western highlands but increases to about 5 centimeters (2 inches) in the eastern highlands and lowlands during the latter half of the winter season. Spring and autumn are seasons of change toward the conditions of approaching major seasons. Temperatures are generally moderate. The highest temperatures, in the lowlands and coastal areas, are usually in the low 90's but have been as hot as 102°F. Freezing weather occurs only in the highland areas where winter temperatures are 20° to 30°F.; temperatures well below 0°F. can occur on the higher mountain peaks.

Ports play an important role in the economy. Shanghai is the most important commercial, shipping, financial, and manufacturing center of Communist China; Nanking, Wu-hu, Chiu-chiang, and Wu-han, all on the Yangtze River, are important transportation, agricultural, and commercial centers. Amoy is the major collection and distribution center serving the central section of the LOC area, and Canton is the most important economic and agricultural center in the southern part of the area. Fort Bayard, on the eastern side of Liuchou Peninsula, is an important distribution center for agricultural and mineral products of the hinterland.

With about 5,300 kilometers of coastline, South China has few beaches favorable for logistical over-the-shore operations because of flat nearshore bottom slopes, lack of man-made exits, and difficult cross-country movement. Moreover, sea approaches contain such dangers as scattered islets, islands, rocks, shoals, and fish stakes and traps; large tidal ranges, strong tidal currents, and high surf are also detrimental to operations. The coast consists predominantly of mountains and hills which rise abruptly from the sea; however, parts consist of narrow plains and lowlands. Although highway Route 27 is generally within 30 kilometers of the coast, access to it is restricted to the limited number of manmade routes because of numerous obstructions to cross-country movement.

The air facilities consist of 96 airfields with runways over 610 meters in length; of these, 72 are capable of supporting operational USAF transport aircraft of C-123 type or larger. All of the 16 airfields selected for this study will support C-141's.

Railroads are the most important mode of transport. The networks, totaling 11,300 kilometers or almost one-third of the Communist Chinese Railroads, is standard gage (1.435 m. or 4'8 1/2") and single track except for 365 kilometers of double track and 862 kilometers of single track, narrow-gage lines. The railroads are the principal means of long-distance freight and passenger transport and provide the only relatively high-capacity north-south routes through the region.

The highways of South China are used for short-haul movement and to provide feeder services to the railroads and inland waterways. Most of the traffic is still non-motorized farm-to-market transport. Because of the many poorly-built and poorly-maintained roads and the numerous narrow, low-capacity bridges, the highway system is inadequate to support sustained military traffic. Most of the selected routes are of gravel or soil-aggregate and only one lane wide. In several critical areas, such as along the southern border and opposite Taiwan, the highways have been improved to support limited military traffic, but in most of South China, especially inland, road improvements are negligible.

Inland waterways play a significant role in South China's transport system. Country-wide, waterways rank second to rail in ton-kilometers of cargo carried, and in some southern provinces, such as Hunan and Kuangtung, waterways constitute the principal mode of transport. The Yangtze is the most heavily trafficked waterway in all of China and serves as a major logistical route for over 2,500 kilometers from its mouth, near Shanghai, to Chungking. The Grand Canal, providing north-south routes from the Yangtze, parallels the coast in the vicinity of Shanghai. The Chu Chiang system, radiating from the Canton area, provides a major east-west logistical route through the southern provinces of Kwangsi and Kuangtung. The fleets are composed largely of junks and sampans which carry about two-thirds of waterway tonnage, but the use of modern steamers, motorships, and barge trains is increasing. With few exceptions, inland waterway port facilities are primitive; reliance is on manpower rather than mechanical handling.

Telecommunication (telecom) facilities in South China are second in density to those serving the industrialized northeastern regions. Key urban areas are linked by a network of low capacity open-wire or cable lines, a few radio relay links, and numerous high-frequency radiocommunication stations. Special purpose facilities are operated by most government agencies for their unique requirements. International radio services to most world centers are available from Shanghai and Canton; wire services are more limited.

There are no petroleum pipelines in South China capable of supporting or supplementing the selected lines of communication.

## (G) PORTS (General Information)

South China's coastline is irregular and indented by numerous bays and estuaries, of which many are sheltered by fringing islands. Many of the natural harbors along this coast are not suitable for development as ports because of heavy silting and the lack of adequate lines of communication inland through the mountainous terrain.

In the LOC area there are one principal and seven secondary ports; all but two are classified as river ports. Most of the ports, the larger urban and industrial areas, and the principal lines of communication are concentrated at the northern and southern ends of the coastline. Only one port is situated on the central coast of the area.

The principal port of Shanghai, the largest in Communist China, and four of the secondary ports, Nanking, Wu-hu, Chiu-chiang, and Wu-han, are along the Yangtze River in the northern part of the area. Amoy is centrally located on the coast in the Formosa Strait. The remaining ports, the Canton/Huang-pu complex and Fort Bayard (Chan Chiang), are in the southern part of the area.

Shanghai, on the Huang-p'u Chiang (Whangpoo River) immediately above its junction with the Yangtze River, is the most important commercial, shipping, financial, and manufacturing center of Communist China. The port provides extensive wharfage and storage facilities, and has the largest concentration of shipbuilding and repair yards in Communist China. Shanghai serves as a naval operating base and is the headquarters of the East China Naval District. Nanking, Wu-hu, Chiu-chiang, and Wu-han, all on the Yangtze, are important as transportation, agricultural, and commercial centers, and provide varying amounts of wharfage and storage facilities. Wu-han has a large shipbuilding facility.

Amoy, a major collection and distribution center serving the central section of the area, is primarily a lighterage port but has a good deepwater anchorage. Facilities for covered, open, and POL storage are ample. Amoy has minor shipbuilding and ship-repairing capabilities and minor naval facilities.

Canton, 64 kilometers up the Chu Chiang, is the capital of Kwangtung Province, the largest city, and the most important economic and agricultural center in the southern part of the LOC area. Huang-pu, about 16 kilometers downstream, is the deep-water port for Canton and the site of a large naval base and shipyard. The Canton/Huang-pu complex provides extensive wharfage and storage facilities and has the largest concentration of shipbuilding and repair yards in the southern part of South China.

Fort Bayard, on the eastern side of Luichow Peninsula, is an important distribution center for the agricultural and mineral products of the hinterland. It is the first modern port designed and built by the Chinese Communists. The port provides a fair amount of wharfage and storage facilities. Fort Bayard has a small naval operating base and is the headquarters of the South Sea Fleet.

## (G) BEACHES (General Information)

The South China mainland has a coastline of approximately 5,300 kilometers. Sea approaches are via the Gulf of Tonkin, the South China Sea, the Formosa Strait, the East China Sea, and the Yellow Sea. Offshore approaches are clear along most of the coast, but nearshore approaches are generally obstructed by fish stakes and traps, rocks, reefs, shoals, islets, islands, and tidal flats that commonly extend considerable distances seaward.

Along the coast high surf occurs much of the time. The largest percentage of high surf, predominantly created by monsoonal winds, occurs along the coast exposed to the northeast monsoon. This season usually lasts from November through March. The southwest monsoon is less persistent in strength and direction but buffets the coast during most of June, July, and August. Tropical cyclones or typhoons, causing prohibitively high surf, may occur at any time but are most likely to affect the area from July through September. Surf 1.2 meters or higher occurs as much as 23% of the time during the southwest monsoon on selected beach 2, but on other selected beaches high surf occurs less than 15% of the time during all months.

Tides are predominantly semidiurnal but have diurnal components that become increasingly strong toward the south and west, culminating in a predominantly diurnal tide in the Gulf of Tonkin. The greatest tidal ranges are near Foochow and in Hangchow Bay where maximums are about 7.1 and 8.5 meters. From these peak ranges the tides reach a low of about 1 meter in the Hong Kong area.

The South China coast is deeply indented by bays and estuaries. Hillocks, hills, and mountains extend to the shore, but narrow, isolated, level to undulating plains and lowlands are scattered along the coast. The plains and lowlands are extensive along river courses and the extreme northern part of the coast. Drying tidal flats partly fill many of the bays and estuaries, but rocky shores predominate along hilly promontories. Sandy shores are commonly at the seaward ends of valleys and front parts of plains and lowlands exposed to wave action. The plains and lowlands contain numerous dikes, ricefields, marshes, and saltpans; steep adjoining slopes in many places are terraced and cultivated.

Sand is the predominant material of the selected beaches, but between the high water and low water lines on several beaches mixtures of sand, mud, and silt are common. Trafficability is fair in sandy areas and poor where significant amounts of mud and silt are present. Only a few beaches have nearshore bottom slopes which would allow LST's to make dry-ramp landings. Because of the extreme flatness of nearshore bottom slopes and poor trafficability of the foreshore, landings on some beaches would be feasible only at high tide or by using long pontoon causeways. Exit conditions from most of the selected beaches are fair to poor and in most cases are limited to tracks and trails. Cross-country movement is generally impeded by wetland ricefields, streams, irrigation ditches, marshy areas, and rugged terrain.

U.S. or Allied Forces have not attempted amphibious operations in South China, but several successful landings were made by Japanese Forces in the late 1930's and early 1940's. Several of the islands once held by Nationalist Chinese were taken by Communist Chinese Forces during the 1950's.

### (S) RAILROADS (General Information)

The rail network within South China totals 11,300 kilometers, all standard gage except for 644 kilometers of meter gage and 166 kilometers of 0.610-meter gage in Yunnan Province and 52 kilometers of 1.067-meter gage on Hainan Island. Some 365 kilometers of the standard gage are double track. There is no electrification in the region. With the exception of the short narrow-gage line on Hainan, all the lines are operated by the Government's Ministry of Railways. Only the trunk and principal branch lines are treated in this study.

Two international connections are made, both with the meter gage railroads of North Vietnam. At P'ing-hsiang transloading is required from the standard gage Chinese system; the other connection is at Ho-k'ou and Lao Cai, where the Yunnan meter gage line permits through traffic. Equipment of the two meter gage systems is compatible.

The railroads are the principal means of long-distance freight and passenger transport in South China and provide the only relatively high capacity north-south routes through the region. They serve the major ports and connect the agricultural, industrial, and population centers. The rail system also provides the primary routes for movement of military supplies and personnel within the area and toward Southeast Asia. The principal weakness of the network is the nearly total lack of alternate routes. Further, the network generally is of less capacity than the networks in northern or northeastern China and less effort has been made to develop or improve it.

Throughout Communist China, traffic requirements have been much less during recent years than during 1959, the peak year of the "Great Leap Forward" campaign. During that year 542 million tons were carried by the railroads, as compared to 415 million tons in 1964. The current adequacy of the system is due in part to the low level of traffic required to support the economy. A sustained military emergency would probably tax the capabilities of the system to a serious extent and hinder the economy.

Although much effort has been expended since the Communists gained control of the network, track structure still is not standardized throughout South China. Rails are standard T-section, however, and on most standard gage lines weigh about 90 pounds per yard and are 12 or 24 meters in length. In a few places rails have been welded into lengths of 500 meters to 1 kilometer. Although pre-stressed concrete ties have been introduced, ties are mostly creosote-treated timber, spaced from 1,440 to 1,600 per kilometer. Crushed rock ballast is plentiful and there is a tendency to increase its depth beyond the required 25.4 centimeters on main lines in order to increase line capacity. All materials are now produced domestically. Rails are in short supply and are inferior to those formerly procured from the U.S.S.R. for use on main lines. The axleload limits, estimated at 23 short tons although some lines may have higher limits, are probably the lowest in China for main lines.

Train control on single track lines is manual block, usually with mechanically operated semaphore signals. Double track lines may have automatic blocking and color-light signals, but train control in South China is possibly less efficient than in northern China. Communication between stations is by telephone and telegraph.

The system has at least 3,000 bridges, cut-off length indeterminate, totaling an estimated 110 kilometers in length, and about 730 tunnels totaling 217 kilometers. Most of the bridges are of steel construction, either through-truss or deck plate girder, with concrete or masonry piers. Many bridges on newer lines have pre-stressed concrete beam spans. Bridges are generally maintained in good condition. The longest one in South China is the 1,167-meter double-deck rail and highway bridge over the Yangtze River at Wu-han. A still longer structure is now under construction over the Yangtze between Nanking and P'u-k'ou. When completed in a few years, it will replace a rail ferry now operating 3 ships with a combined daily capacity of 22,000 short tons per day. The longest tunnel in China, 4,070 meters, is located west of Shui-ch'eng on the newly-constructed Kuei-yang-K'un-ming sector. Tunnels are single track and in good condition.

Yards generally lack modern equipment and mechanization but are considered adequate for present requirements. Many improvements were made between 1954 and 1960; more were planned but further information has not been available. Classification yards are generally flat but humps may have been installed in a few of the most important ones. The principal yards are located at Wu-han, Nanking, Shanghai, Ying-t'an, Chu-chou, Heng-yang, Canton, and Liu-chou. Repair shops are located throughout the system, including all main yards, but machinery is often very old and facilities inadequate. Plants located at Ch'eng-tu, Wu-han, Ch'i-shu-yen, Chu-chou, Nanking, and Canton make heavy repairs in addition to producing new equipment.

In 1961 the entire standard gage equipment inventory of Communist China consisted of an estimated 5,300 locomotives, mostly steam, and 132,000 freight cars. There probably has been little change up to the present. Information is not available on equipment assigned to specific parts of the national system but it can be transferred between areas as required. All locomotives in South China are coal-fired steam traction and probably include many of the older and less powerful units in service. Supplies of coal and water are adequate throughout the area; water is generally untreated but may be filtered. The most common freight locomotive type is the "MK-1, Modified" with a 2-8-2 wheel arrangement and tractive effort of 44,000 pounds. Most freight cars are 4-axle gondolas or box cars of either 55 or 33 short ton capacity, ranging from 5 to 15 years in age. Automatic couplers and air brakes are in general use. Equipment has been completely adequate for the reduced traffic requirements since 1960, but its condition is probably only fair due to poor maintenance.

The meter gage system in Yunnan Province is estimated to have around 100 old coal-fired steam locomotives and 2,500 freight cars, which is probably adequate for this low-capacity system. The typical locomotive has a tractive effort of 23,000 pounds and the average freight car a capacity of 16.5 short tons.

It was estimated that 1.5 to 2.0 million persons were employed by the railroads during the peak years 1958-59 but there were severe personnel cutbacks in 1960 and 1961. There is still a shortage of experienced personnel and a low level of operations prevails, although large numbers of both men and women have attended the extensive system of railroad technical schools. This has been one of the chronic operational problems, having an effect on operating efficiency and on track and equipment maintenance.

Construction and maintenance problems are caused by shortages of materials and by adverse terrain and weather. Domestic industry has been unable to produce an adequate supply (in either quality or quantity) of fabricated steel, such as rails, locomotive and car wheels, or bridge spans. There has been little attempt to purchase abroad since supplies from the U.S.S.R. were cut off about 1960. Flooding and washouts are seasonal problems in mountainous and hilly areas.

Recent development has been extensive in the western part of South China. New lines have been and are being constructed to connect strategically-important Yunnan Province with the standard gage network via Kwangtung and Szechwan Provinces. There has been no recent activity in the central and eastern parts of the region but double-tracking of the Wu-ch'ang to Canton line is again a possibility, as is a line to the coastal port of Swatow. Improvements to increase line capacity are likely along routes leading to North Vietnam.

## (5) HIGHWAYS (General Information)

In South China the highway system is better constructed and maintained than in the rest of the country. South China's highway system generally compares favorably with that of the U.S.S.R., but is inferior to that of India. Although adequate for normal traffic, it would be subject to rapid deterioration under heavy military traffic. The highways are designed and used principally for short-haul movement of 30 to 50 kilometers and, country-wide, carry only about 3% of the total ton-kilometers of modern freight traffic. However, highways serve as feeder routes for the collection and distribution of the bulk of agricultural production throughout China.

Communist China has a highway density of 0.049 kilometer of road per square kilometer of area, the lowest of the world's great powers, as compared with 0.217:1 ratio of India. However, the network effectively supplements the railroads and an ancient and intricate waterway system. The highway pattern is erratic, since it reflects the agricultural pattern, but a few through routes of national significance have evolved. Partly because of availability of construction material and labor in South China, most of the principal highways have a constructed base and are generally completely bridged. However, most of the highways are built on weak embankments between cultivated fields or have no constructed base at all, and are barely adequate for the low-density seasonal traffic.

The highway network in Communist China totals about 520,000 kilometers, of which an estimated 240,000 kilometers are in South China. About 50% of the total network (260,000 kilometers) are unimproved earth roads and tracks, 1.5 to 4.5 meters wide, poorly maintained, and suited mainly for animal-drawn carts. At least 25% of the roads (130,000 kilometers) are improved earth, generally one-lane, secondary roads, 2.5 to 5.5 meters wide, in poor to fair condition. The remainder of the network consists of principal roads with gravel, crushed stone, or soil-aggregate surface, 3 to 9 meters wide, in fair to good condition. In South China, typical principal roads have soil-aggregate surfaces 3.5 to 4.5 meters wide with earth shoulders 0.5 to 1.0 meters wide, and are in fair condition. The soil-aggregate or crushed stone roads in this area consist of a surface course of natural earth over a base of manually crushed and tamped stone or gravel.

Because of a great number of perennial streams and a heavier traffic density, bridging is of greater necessity in South China than elsewhere in China. Bridges under 30 meters in length are predominantly of timber or masonry construction, but considerable effort is being made to replace those on principal roads with reinforced-concrete structures. Bridges over 30 meters (the cutoff for the route tables) are mostly reinforced-concrete beam-type. Steel bridges usually have individual spans of 30 meters or more. The condition of most timber bridges and many masonry bridges is poor, resulting in a gross load capacity of under 7 tons on most secondary and on some principal roads. Steel and reinforced concrete bridges usually have an adequate capacity. Most bridges are single-lane, and many of the smaller bridges, with widths less than 4 meters, are bottlenecks. However, since the traffic density is low this is not a serious problem. There are very few highway tunnels and no galleries in South China.

Construction and maintenance of highways which are of critical or strategic importance to the Central Highway Bureau in Peiping are often accomplished by the army, but principal provincial or interprovincial commercial arteries are usually built and maintained by the various Provincial Highway Bureaus. Local roads are built by the county, commune, village, or factory or mine involved, and maintained only under extreme necessity. At all levels of highway construction and maintenance, authorities generally use conscripted local labor, often in massive numbers. With few exceptions, workers use crude manual tools and locally available materials. The continuing practice of building generally low-grade roads suggests that maintenance will continue to be a major problem.

There are about 240,000 motor vehicles throughout China, of which about 200,000 are trucks, about 32,500 are passenger cars, and about 7,500 are buses. The truck inventory is composed mainly of old American and Soviet trucks, and has remained rather constant in the past 5 years. However, due to near-capacity domestic output (25,000 per year), and improved prospects for purchasing of heavy-duty trucks from France, Italy, and other western countries, the number and quality of trucks are expected to increase gradually in the next 5 years.

As in the rest of China, roads in the south are usually rough and narrow, often dusty, and frequently pass through congested towns and villages. When the heavy summer rains occur, side hill cuts are subject to landslides, embanked roads may be washed out, and temporary inundation is prevalent everywhere. A great many ferries are located even on principal routes. Although sufficient for the local traffic density, the low capacity and slow speed of these ferries would create extensive bottlenecks for sustained military traffic. There are few fords, but extensive sections of sharp curves and steep grades exist. Public fuel and repair facilities are non-existent.

Recent highway development in South China has been concentrated on local and farm roads projects, and on critical border roads. The former is an effort to improve collection and distribution of agricultural products and increase governmental control over formerly isolated areas. The latter is an effort to improve China's military posture by increasing the number of international highway connections (from 9 in 1962 to 15 in 1966) and by improving the alignment, surface, drainage, and stream crossings of strategic roads.

#### (6) INLAND WATERWAYS (General Information)

The 8,043 kilometers of waterways treated in this study were selected from the 40,000 kilometers of navigable waterways in the area. In general, the selected waterways represent strategic, high-capacity logistical routes providing access from two major coastal ports, Shanghai and Canton, to vast interior areas of South China. Sections of major routes on the Grand Canal and the Chu Chiang and Yangtze Systems serve their respective areas as the primary modes of transport; less significant tributary and coastal waterways serve as important alternate routes to major rail and highway routes.

With the exception of the Grand Canal and the Ling Ch'u Canal, the waterways selected are natural streams. They are affected to varying degrees by silting conditions and require continued maintenance and dredging in critical channel areas. Navigability is also affected by seasonal water-level fluctuations; low water generally occurs from December through February with high water peaking in the months of June and July. Tidal conditions prevail in the lower reaches of waterways emptying into the sea. For the most part, the waterways are not subject to freezing.

Inland waterway port facilities in South China vary in size and complexity. The most sophisticated inland waterway accommodating facilities are located in the maritime ports of Shanghai and Canton. Toward the interior of the country the facilities become progressively less adequate and in many locations consist only of rudimentary wharves or unimproved riverbanks. In all cases, modern handling facilities are at a premium. Availability of inland waterway craft in both the primitive and modern categories is treated on a system basis, although some fleets can be interchanged through coastal transit or via interconnecting interior waterways. New craft and navigation techniques are being introduced into China at an increasing rate. Barge-tow combinations and modern steamers and motorships are being used. The primitive fleet of junks and sampans, with unit capacities ranging up to 500 deadweight tons, is used extensively throughout South China. This fleet, which provides abode for millions of Chinese, represents a continuously manned transport capability. It is estimated that 65% of the waterway cargo volume in China is transported by the primitive fleet.

On the whole, waterway operations are not vulnerable to interdiction. Except for a gorge section of the Yangtze and a limited number of locking structures on other waterways, there are no significant interdiction points. Numerous port facilities are in use, but they are primitive by western standards, and many could be replaced by riverbank transshipment operations if necessary. The invulnerability of the waterways is further insured by the availability of vast human resources for the operation of the large, widely distributed, primitive fleets and for the necessary transshipment operations.

It is estimated that the two main waterway systems in South China, the Yangtze and the Chu Chiang, account for at least 60% of the cargo carried by modern waterway transport in China. The Yangtze System, with its Kan Chiang, Hsiang Chiang, and Wu Chiang tributaries, constitutes the more important of the two systems. The Yangtze System drains a vast industrial and agricultural heartland. It provides maritime access inland as far as the port of Hankow, 1,126 kilometers from the mouth. For an additional 1,397 kilometers the main stream is navigable by junks, barges, tugs, and large river steamers while the tributary waterways provide significant steamer service throughout much of their extents. Principal cargo transported on the system consists of agricultural products, building materials, coal, industrial raw materials and manufactured goods.

Exclusive of the maritime ports on the lower Yangtze, the more important waterway ports on the System include Chungking, I-ch'ang, Sha-shih, Ch'ang-sha, and Nan-ch'ang.

It is estimated that the steamer capacity on the Yangtze is 275,000 deadweight tons (DWT) with approximately 82,000 DWT available on the river above Hankow. About 500,000 DWT of barge shipping is also estimated to be available on the upper Yangtze. The primitive fleet on the Yangtze System is approximately 2,000,000 DWT with another 900,000 DWT available from the primitive coastal fleet. In addition, operations on the lower Yangtze could be augmented to a great extent by maritime shipping. The total fleet available to the Yangtze System is in excess of that necessary to sustain the capacities indicated, including those on the Grand Canal. The factors limiting waterway operations on the Yangtze System are considered to be congestion and operating inefficiency rather than craft availability.

The major point of potential interdiction on the Yangtze System is the restrictive gorge area downstream of Chungking. This section has been extensively improved to allow for perennial navigation by large river steamers. Strikes against the precipitous canyon walls in this section could effect rock slides and block the navigation channel.

The Chu Chiang System consists of multiple routes radiating from the Canton port complex and the Chu Chiang Delta. It includes the Chu Chiang, the Hsi Chiang/Yu Chiang, the Kuei Chiang, the Pei Chiang, and limited extents of selected tributaries. This System, the primary transport distributive network through southern South China, provides for significant east-west movement and through waterway access to the North Vietnamese border. Maritime vessels can navigate 339 kilometers inland to the port of Wuchow, and scheduled steamer service is available to Nan-ning, 989 kilometers upstream of the mouth of the Hsi Chiang. Cargo carried on this System includes agricultural products, POL, and manufactured goods.

Primary waterway ports in the area include Kongmoon in the Chu Chiang Delta, Wuchow, and Nan-ning on the Hsi Chiang/Yu Chiang.

The fleet available on the Chu Chiang System includes an estimated barge capacity of 300,000 DWT. Information on the remainder of the fleet is unavailable, although it is considered to be in excess of 80,000 DWT. The primitive river fleet available to the Chu Chiang System is estimated at over 1,000,000 DWT with another 300,000 DWT available from the coastal fleet. The carrying capacity of the fleet available to the Chu Chiang System is considered to be in excess of that required by the capacities indicated, which reflects limitations derived from operating inefficiency and traffic congestion rather than the availability of craft.

Potential interdiction points on this System are the heavily diked areas in the delta and the recently constructed locking facilities on the Hsi Chiang/Yu Chiang.

The Grand Canal provides the only significant north-south waterway route in China. The Canal, under restoration, will provide a through capability for craft of 3,000 DWT from Tientsin to Hangchow. The portion of the canal in the study area provides navigation through a lake and lowland area that is not conducive to the development of rail and highway transport. It serves the industries in the Shanghai-Hangchow area with fuel and raw material resources, including coal, POL, ores, and grain.

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## (S) INLAND WATERWAYS (Continued)

Port facilities along the canal are extensive and continuous. Primary port facilities are located at Hangchow, Wu-hsi, and Soochow.

Waterway craft can be supplied from the Yangtze System in adequate numbers to sustain the indicated capabilities.

The Grand Canal is the most vulnerable waterway route in China. Strikes against the Canal dikes or tidal gates and locking structures could effectively interdict canal movement.

The Ling Ch'u Canal, connecting the Hsiang Chiang and the Kuei Chiang (tributaries of the Yangtze and Chu Chiang Systems, respectively) is an extremely limited route with only a small craft capability. However, it is significant because it provides a connection between the two major systems of South China and could be used to shuttle small craft between systems.

The Min Chiang, an independent coastal river, is significant for its potential as a military logistical route for action against Taiwan.

The waterways treated in western Yunnan Province, the Red River and the Mekong, are low-capacity mountain streams of potential exploitation for an all-out logistical effort southward into Laos and North Vietnam.

## (S) AIRFIELDS (General Information)

The airfield system in South China is well distributed and capable of supporting all types of air operations. The Communist Chinese have established an integrated airfield system disposed in depth to meet defensive and offensive air requirements. This system also satisfies the requirement for civil air operations, as it includes many large airfields at key centers which are in joint use by civil and military aircraft. Smaller airfields adequately handle the civilian transport requirements of the more isolated areas. International civil air operations are relatively insignificant, reaching only points in nearby U.S.S.R., North Korea, North Vietnam, and Burma. Services on domestic air transport routes, however, are extensive and vital to the economy. In addition to the regular scheduled routes, widespread use is made of transport aircraft for nonscheduled charter and special operations.

There are a total of 96 airfields in South China with runways over 610 meters in length, which is about one third of the total number of such airfields in all of China. Over one half (54) of the airfields in the south have permanent-surfaced runways over 1,830 meters in length, of which 3 are over 3,050 meters. These airfields are generally well distributed throughout the area and will handle C-141 aircraft. Of the remaining airfields, 9 will support C-133's, 9 will support C-123's, and 21 of the remaining 24 will support C-47's. The Canton/White Cloud airfield in Canton handles the majority of the international jet traffic for South China.

The climate in South China ranges from tropical to temperate, with a marked monsoonal circulation. Air masses of South China are quite similar to those which prevail over the southern U.S. Mean surface winds show little seasonal variations with yearly mean velocity ranging from 3.2 to 27.3 kilometers per hour. Below 2,450 meters 50% cloud cover occurs more than half the time. In general, visibilities in winter and spring are lower than in summer and autumn; except for local thunderstorms and typhoons air transport operations would not be seriously hampered by the weather.

The Chinese continue to expand their airfield network with emphasis on airfields having a military jet capability with concrete runways of about 2,100 meters or longer.

## **(S) TELECOMMUNICATIONS (General Information)**

South China telecommunication (telecom) facilities are considered capable of meeting current essential requirements and compare favorably with those of other Southeast Asian countries. The present system, however, would not support extended military operations. All facilities are government-owned and -operated to provide essential administrative, defense, and other official requirements.

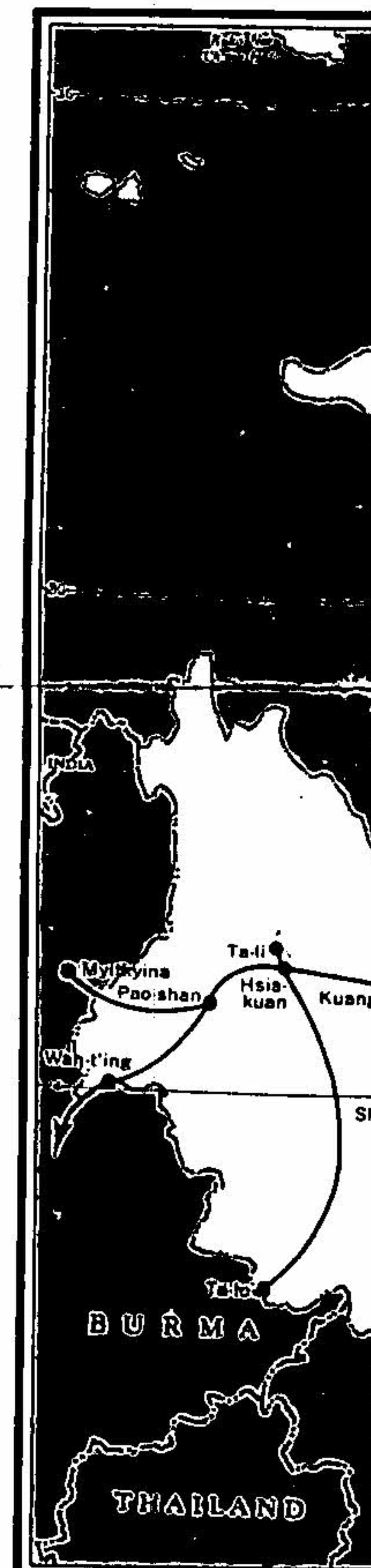
High-capacity telecom facilities are concentrated in the urban areas of Shanghai, Canton, K'un-ming, Hankow, and a few other large cities. Radio relay links of undetermined capacity connect Peiping with Shanghai, Hankow, and Canton. Wire or cable lines follow the main north-south axis via Cheng-chou and provide additional circuits as well as more secure communication services. Other wire lines link the important urban centers of K'un-ming, Nan-ning, and Chungking with Peiping. Main trunk lines are equipped with 3 and 12 channel carrier equipment. In order to supplement and provide emergency communication capabilities, numerous radiocommunication stations are strategically located throughout South China. Landlines usually parallel the established rail and road networks.

Satisfactory telegraph and teleprinter services by wire and radio are available to both populated and remote interior regions, with facsimile service normally confined to the larger cities. Most telephone facilities are manually operated, with automatic local exchanges restricted to such urban areas as Shanghai, Canton, and possibly Hankow. Service to the general public has been intentionally kept at a minimum and is very inadequate. Reliable figures as to telephone density and technical details on the overall system are not available.

International telephone, teleprinter, and telegraph services to major world centers are provided from modern radio facilities in Shanghai and, to a lesser degree, from those in Canton. Low-capacity landlines provide limited telephone and telegraph services to the adjoining countries.

Special purpose telecom facilities are operated by railroad, aeronautical, meteorological, security, defense, and other agencies of the government. Equipment is relatively up-to-date and is giving satisfactory service.

Terrain and climatic conditions have not seriously impeded telecom construction or maintenance. Seasonal flooding, however, has caused temporary damages and disrupted landline communications for short times. The main limiting factor to telecom expansion and operations has continued to be equipment shortages and lack of trained technical personnel. The government is well aware of the need for a modern telecom system and is exerting every effort to improve the existing conditions within the framework of their economic capabilities.



### ~~(c)~~ ASSUMPTIONS

The capacity estimates in this study are based on the following assumptions; those assumptions common to all modes of transport are included under General.

General

1. No allowance is made for enemy interference or weather variables.
2. No allowance is made for civil requirements.
3. Movements are carried out over a sustained period - 90 days or more.
4. Adequate qualified operating personnel are available, and adequate personnel and equipment are available for loading and unloading operations.
5. Adequate engineer support is available.
6. Adequate fuel is available as required.

## Ports

1. Maximum utilization is made of all wharves for general cargo transfer.
2. Estimate is based on use of ship's gear for cargo handling.
3. Adequate clearance from the working area of the wharves to the lines of communication leading from the port is available.

## Airfields

1. Adequate refueling equipment, landing aids, and aircraft maintenance facilities are available.
2. Operations are based on a 24-hour working day.
3. Average sortie frequency is 6 minutes; average downtime is 3 hours.
4. Parking areas will accommodate the same type aircraft used on the selected runway; no parking on other operational runways.
5. Clearance facilities from airfields are adequate.

## Beaches

1. Operations are based on 20 effective working hours per day.
2. Average height of surf less than 1.2 meters.

## Railroads

1. Average-type indigenous freight locomotives and cars are used to estimate trainloads.
2. All trains will be operated at freight train speeds.
3. Trains will not be bunched or fleeted.
4. All rail yards can receive, classify and/or relay, and dispatch the estimated number of trains that can be moved over any given line in a 24-hour period.

## Highways

1. Efficient traffic control is used on all movements.
2. Sufficient numbers of vehicles and drivers are available.
3. Cargo-carrying vehicles average 3.5 short tons per load.
4. Allowances are made for administrative vehicles and civilian traffic on the roads and for reduced efficiency incurred through night operations (the allowances for civilian traffic do not significantly provide for civil requirements).

### Inland Waterways

1. Military cargo is carried utilizing 60% of vessels' weight-carrying capacity.
2. Eighty percent of the craft are considered available, with 20% deadlined.
3. Operating time is 24 hours per day in the ports and on waterways with night navigational facilities, and 14 hours per day on other waterways.

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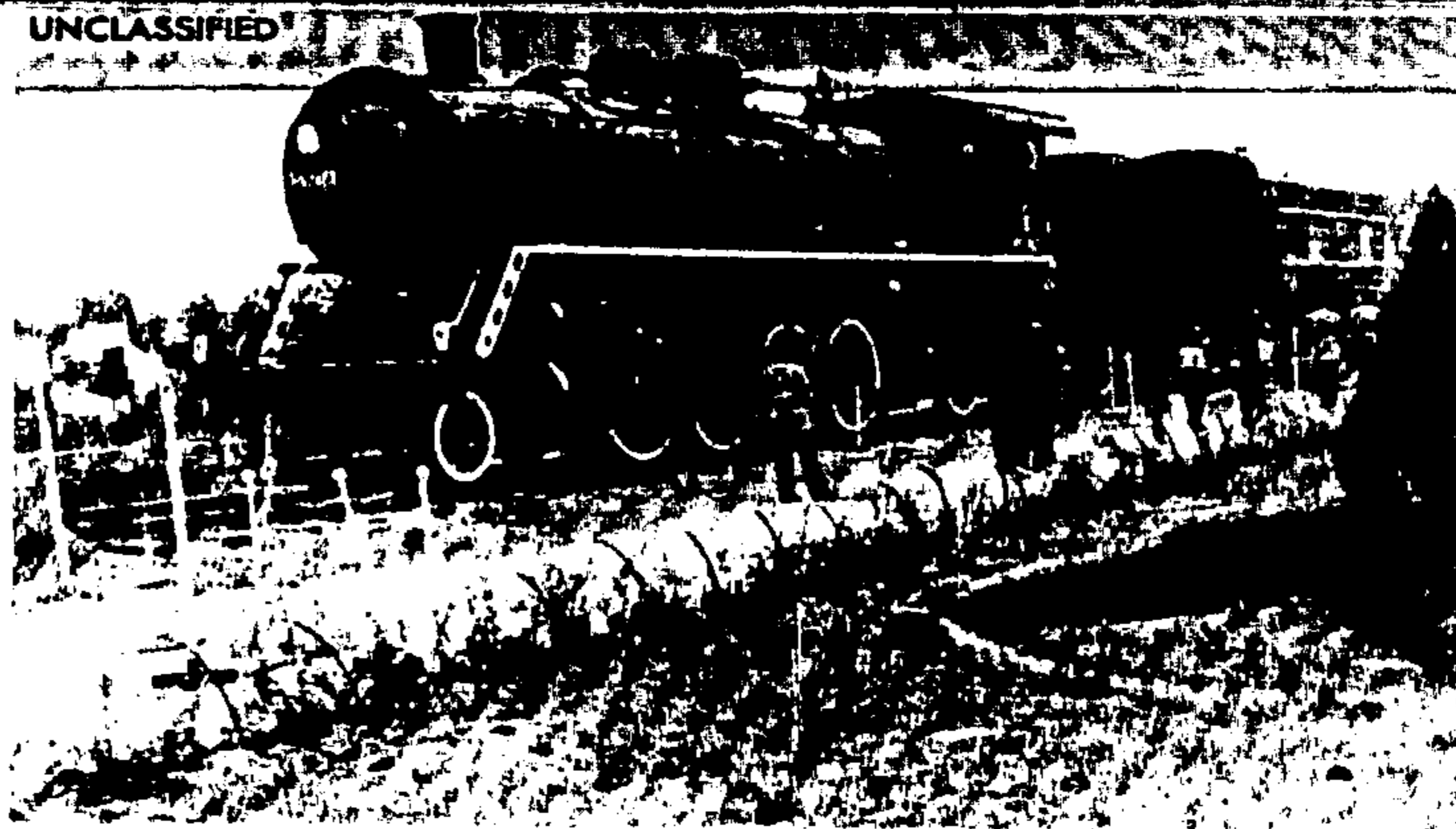


Figure 1. "MK-1, Modified" 2-8-2, standard gage steam locomotive. (U)



Figure 2. Typical standard gage freight cars of the South China railroads. (U)

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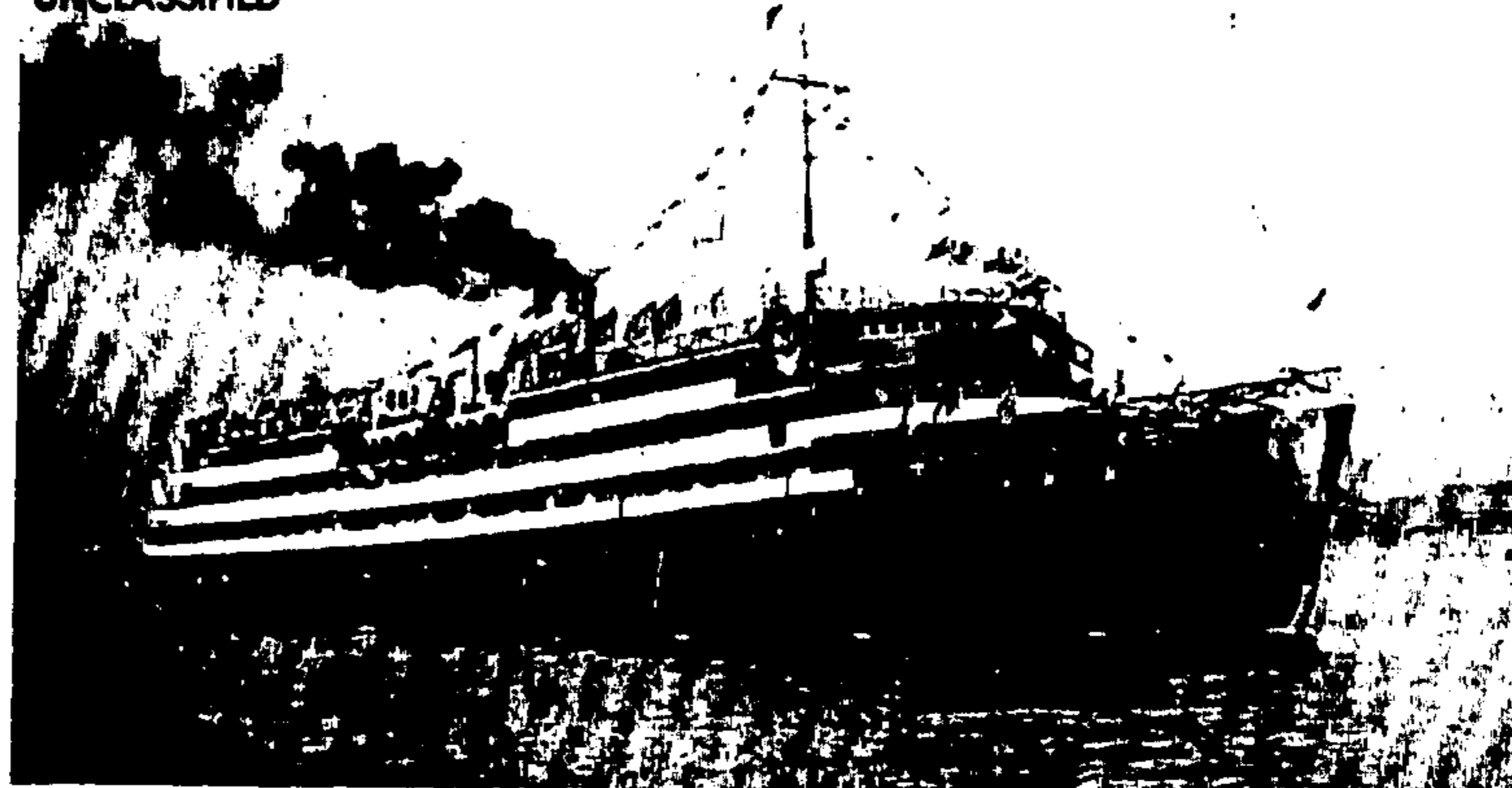
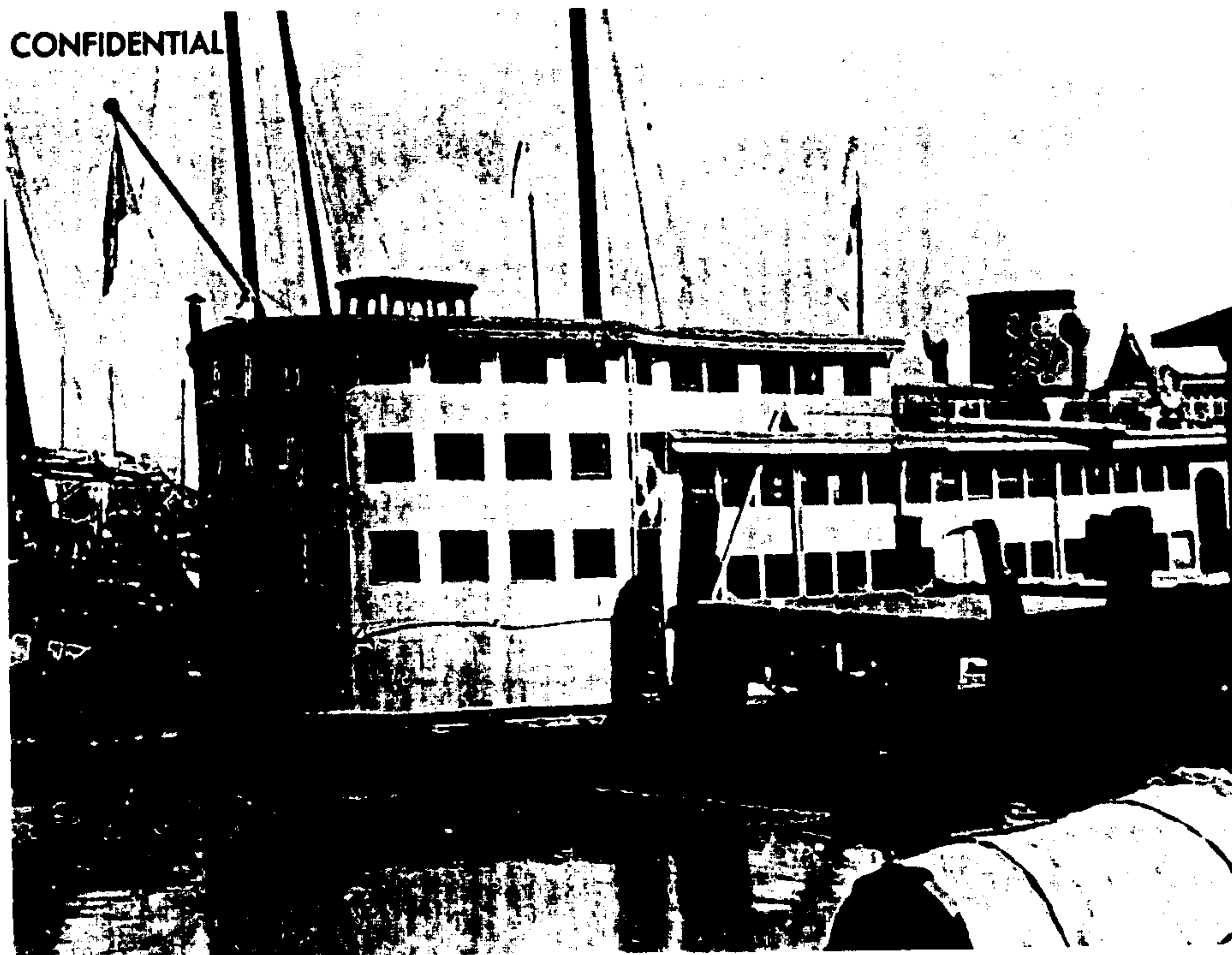
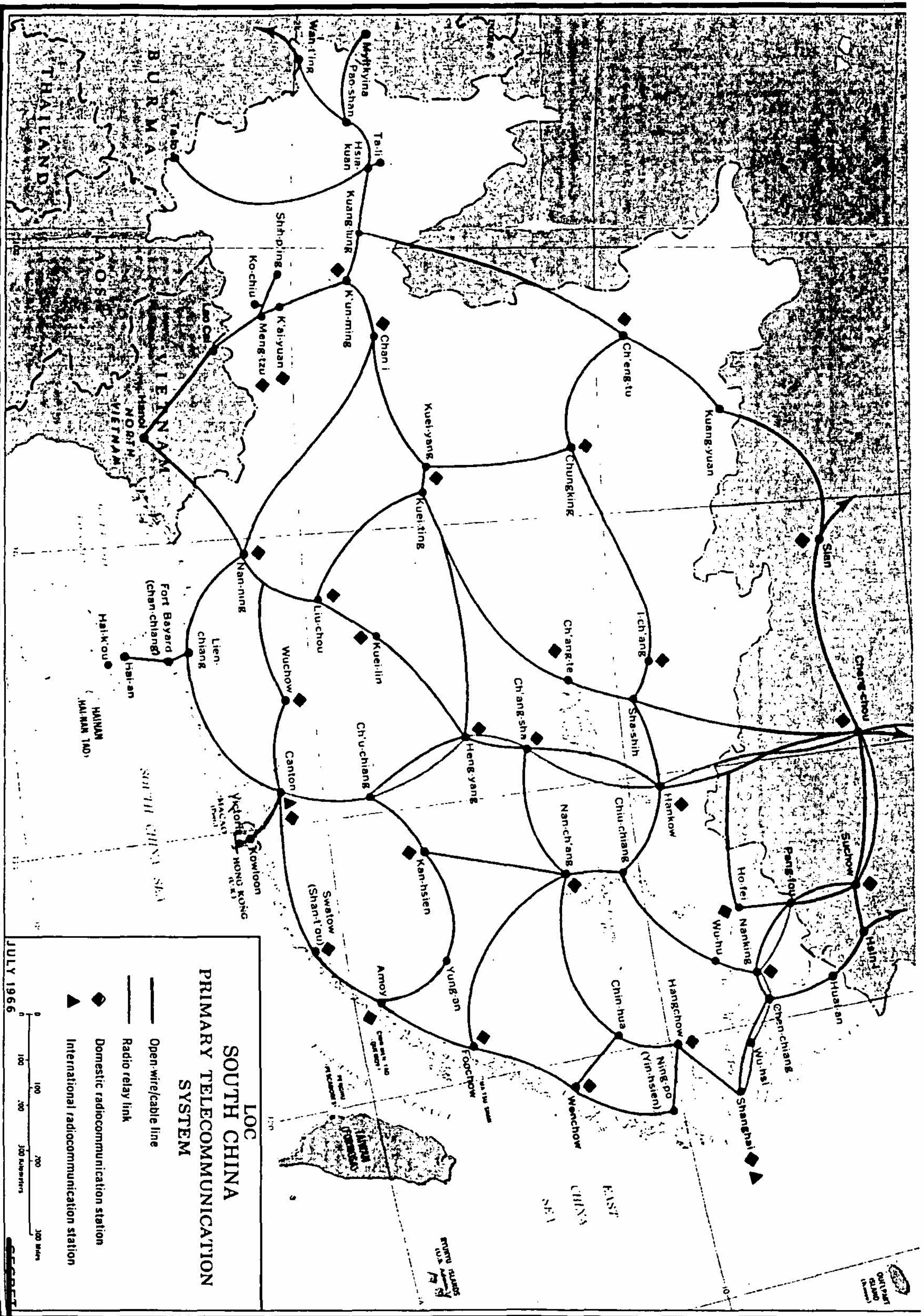


Figure 3. 4,000-ton river steamer with a capacity of 918 passengers and 800 tons of cargo operated on the Yangtze. (U)

SECRET



**Figure 4. Typical river steamer used in the Chu Chiang delta area. (U)**



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Figure 5. Unimproved earth road near Route 26, south of Kuei-lin. These farm roads supplement the feeder roads. (U)

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Figure 6. Two-lane earth-bound crushed stone near Route 27, south of Canton. (U)

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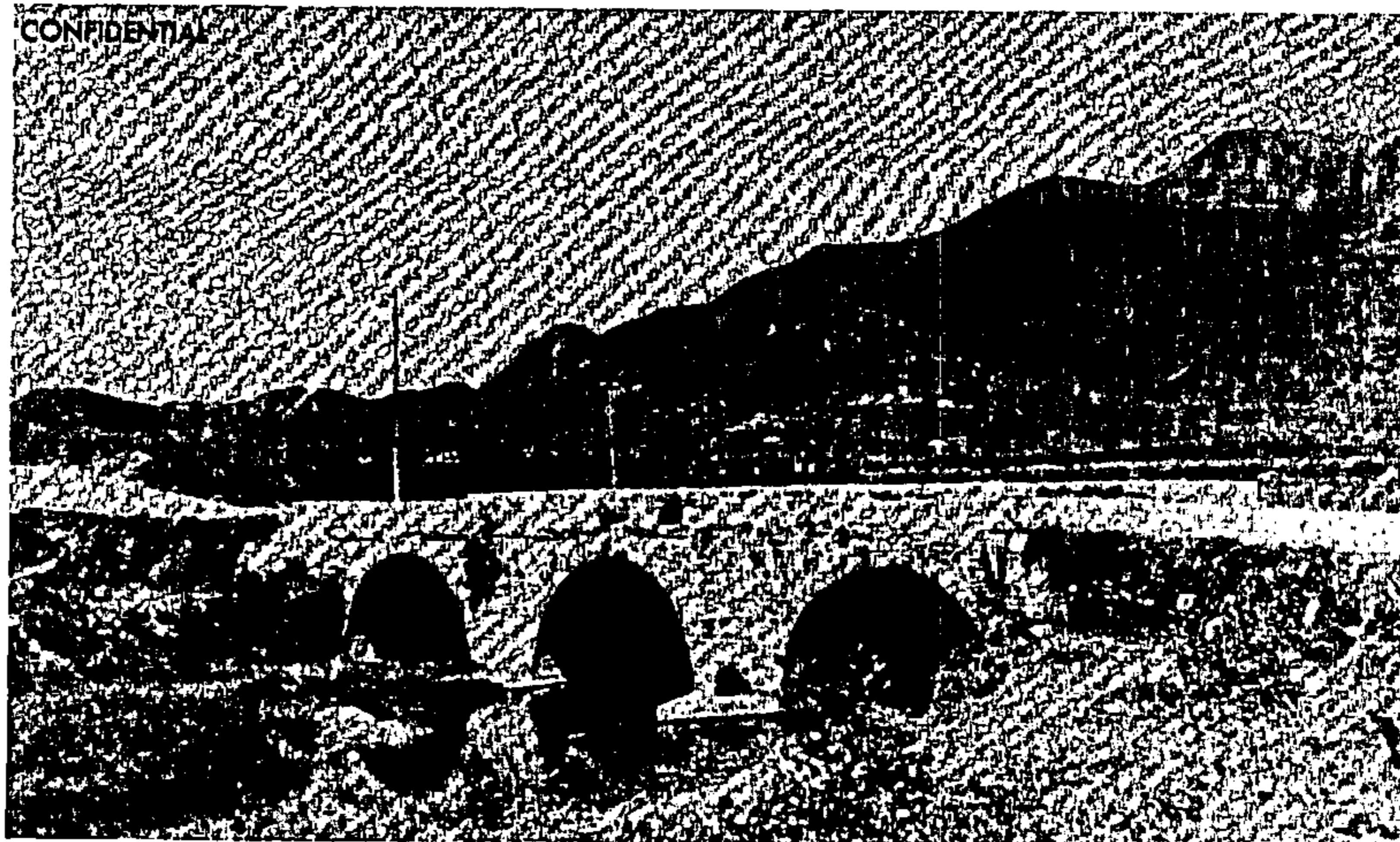


Figure 7. Typical small masonry arch bridge near Route 27, south of Canton. (U)

Figure 7. Typical small masonry arch bridge near Route 27, south of Canton. (U)

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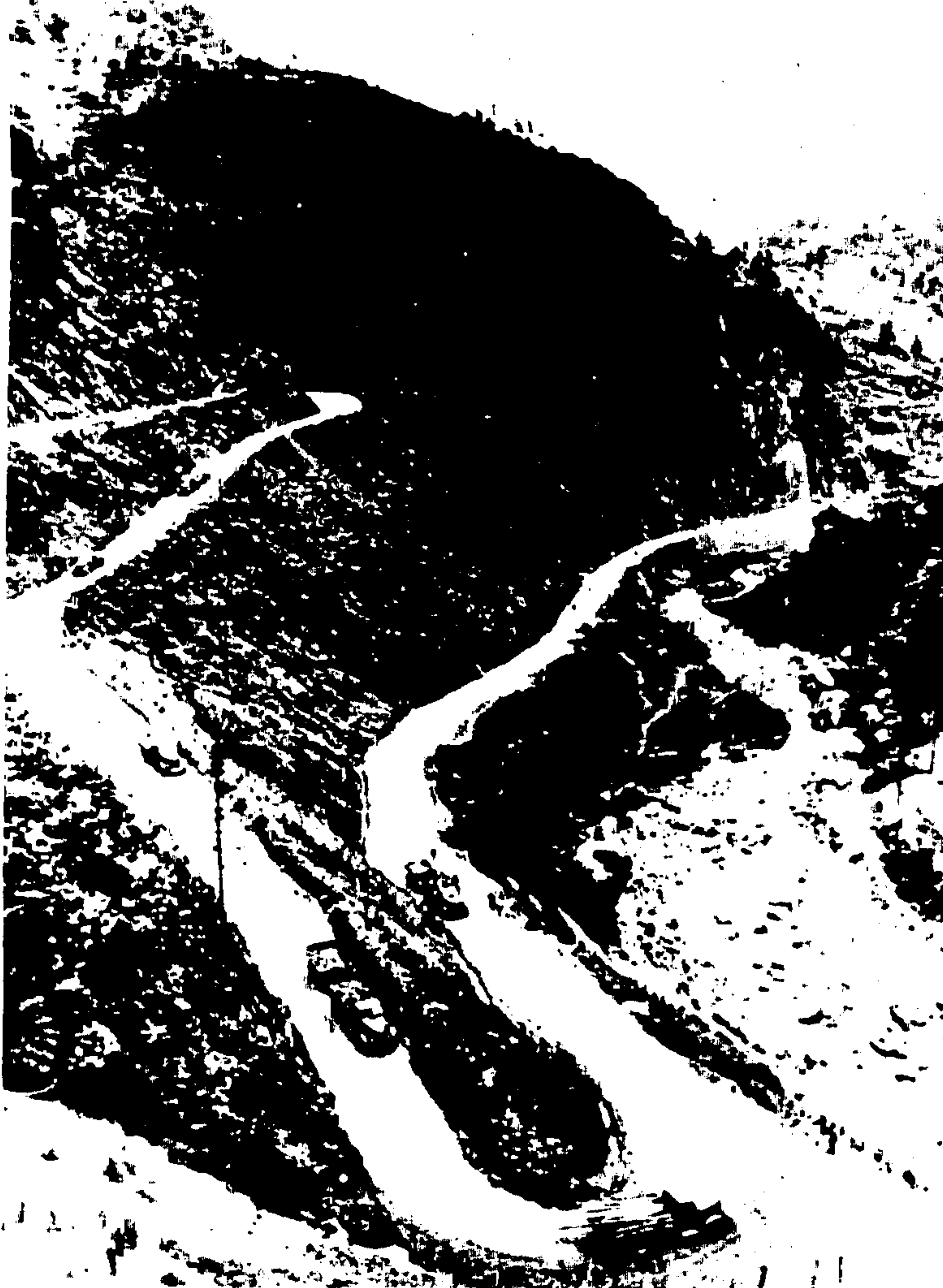


Figure 8. Principal bottleneck on Route 18, north of Han-yuan. (U)

### (9) PORTS

NAME : Shanghai.  
HARBOR : River harbor on the Huang-p'u Chiang extending 39 km. S. from confluence with Yangtze. Total water area about 8 sq. miles; width of river 530 to 800 m.; general depths 5.5 to 18 m.; wharves and other installations on both sides of river.  
FAIRWAY LIMITATIONS: Approach through Nan Shui-tao (South Channel) of Yangtze River; controlling depth over bar in channel 5.8 m. at chart datum (extreme LW) and 9.1 m. at MHWN; entrance to the Huang-p'u Chiang, approx. 64 km. above the Yangtze mouth, about 300 m. wide with a controlling depth of 8.8 m. at chart datum. River channel dredged to a least depth of 7.3 m. at chart datum and 10.4 m. at MHWN; average width 256 m.  
ANCHORAGE\* : Large numbers of berths of all classes in roadstead of Yangtze River; mud bottom, good holding ground; protection good except for occasional winds.  
FIXED MOORINGS\*\* : 4 class A, 9 class B, 15 class C, 24 class D, 4 class E, 15 class PT.  
WHARFAGE : Over 20,000 m. of principal wharfage suitable for transfer of general cargo; numerous supplemental wharves throughout port.  
ALONGSIDE BERTHS\*\* : 12 class A, 6 class B, 3 class C, 19 class D, 44 class E, 134 class F, 4 class T-C, 6 class T-D, 7 class T-E, 2 class DL, 6 class SS, 3 class DE, 3 class MSO, 1 class MSC, 6 class PT.  
CRANES : Cargo: 6 portal jibs, est. capacities 3 to 5 tons; 2 guyed derricks, 1 small and 1 large; 5 gantries, undetermined capacities; and approx. 75 automotive cranes, est. capacities 1 to 2 tons. Shipyard: 17 portal jibs, est. capacities 3 to 25 tons; 8 automotive, est. capacities 1 to 2 tons; 1 tower jib, 1 bridge crane, and 1 shearlegs, all of undetermined capacity. Floating: 12 shearleg derricks, undetermined capacity; 3 stiffleg derricks, est. capacities 3 to 25 tons; and 1 jib of undetermined capacity.  
STORAGE : General cargo: covered, more than 8,500,000 sq. ft.; open, about 75 acres. POL, 2.5 mil. bbl. (approx.).  
CLEARANCE : Rail serves a few wharves on W. side of river; all marginal wharves have truck access to shipside, most offshore wharves limited to truck access to roots of approaches; main coastal highway and north-south coastal rail artery serve port; port also served by an extensive inland waterway system extending far into the interior.  
LABOR : Efficient, plentiful labor supply.  
CAPACITY : 73,700 ST/day.

NAME : Nanking (Nan-ching).  
HARBOR : River harbor 370 km. above Yangtze mouth, 5.6 km. long, 0.8 to 1.6 km. wide with general depths of 16.7 to 38 m. Harbor also includes short section at Ch'en-chia-wa 13 km. downriver, width 0.8 km., general depths 18 to 30 m. Principal facilities on N. side of river (P'u-k'ou) and S. side (Nan-ching); Ch'en-chia-wa facilities on N. bank of river.  
FAIRWAY LIMITATIONS: Controlling depth over bar at river entrance 5.8 m. at chart datum, 9.1 m. MHWN; controlling depths in river to Nanking 9.5 m. during highest river level (Aug. and Sept.) and 7.9 m. during lowest river level (Jan. and Feb.).  
ANCHORAGE\* : Large numbers of class II and III berths above and below Nanking in depths of 17 to 38 m. with poor holding ground but good natural protection.  
FIXED MOORINGS : None.  
WHARFAGE : 1,940 m. of principal wharfage suitable for transfer of general cargo; 1 wharf for POL transfer; several small wharves and considerable amount of river bank suitable for landing personnel and equipment.  
ALONGSIDE BERTHS\*\* : 1 class C, 9 class D, 8 class E, 12 class F, and 1 class T-E.  
CRANES : Possible 100 ton shearlegs on wharf at Ch'en-chia-wa; several floating shearlegs engaged in bridge construction across river in Nanking.  
STORAGE : General cargo: covered, 800,000 sq. ft.; open, ample storage areas, subject to inundation in places. POL, 240,000 bbl.  
CLEARANCE : No rail facilities on wharves, but sidings to rear of several wharves on P'u-k'ou side. 2 single-track, standard gage, rail lines clear port and are important link in China's N.-S. coastal rail network; additional single-track, standard gage line leads SW. to Wu-hu; railroad bridge under construction across Yangtze. Most wharves have paved road clearance from roots of approaches; 4 surfaced highways, 2 principal and 2 secondary, clear port and connect with general road network.  
LABOR : No information available.  
CAPACITY : 4,600 ST/day.

NAME : Wu-hu.  
HARBOR : River harbor approx. 458 km. above mouth of Yangtze; length about 5.6 km.; average width about 1.6 km.; general depths 9 to 22 m.; facilities on E. bank of river.  
FAIRWAY LIMITATIONS: Controlling depth over bar at entrance to river 5.8 m. at chart datum, 9.1 at MHWN; controlling depths in river to Wu-hu 9.7 m. during highest river level (Aug. and Sept.) and 7.9 m. during lowest river level (Jan. and Feb.).  
ANCHORAGE\* : 1 class II and 4 class III in depths 6 to 22 m.; good holding ground of mud; good natural protection.  
FIXED MOORINGS\*\* : None.  
WHARFAGE : 1,020 m. suitable for transfer of general cargo.  
ALONGSIDE BERTHS\*\* : 2 class C, 1 class D, 3 class E, and 13 class F.  
CRANES : None.  
STORAGE : General cargo: covered, 1,067,650 sq. ft.; open, 16 acres. POL, 52,500 bbl.  
CLEARANCE : None of the wharves have rail clearance. 2 single-track, standard gage, rail lines clear port; 1 to N. connects with general rail network. 1 wharf has truck access to shipside and remainder have access to roots of approaches; 2 surfaced highways clear port and connect with general road network.  
LABOR : No information available.  
CAPACITY : 3,200 ST/day.

NAME : Chiu-chiang.  
HARBOR : River harbor, 772 km. above mouth of Yangtze, 2.8 km. long, over 1 km. wide, general depths 7.6 to 18.2 m.; principal facilities on S. bank of river.  
FAIRWAY LIMITATIONS: Controlling depth over bar at entrance to river 5.8 m. at chart datum, 9.1 m. at MHWN; controlling depths in river to Chiu-chiang 8.8 m. at highest river level (July and Aug.) and 3 m. during lowest river level (Jan. through Mar.).  
ANCHORAGE\* : 2 class II and 3 class III in depths 8.5 to 18.2 m.; poor holding ground of coarse sand and gravel; good natural protection.  
FIXED MOORINGS\*\* : None.  
WHARFAGE : 450 m. of principal wharfage and about 150 m. of supplemental wharfage suitable for transfer of general cargo.  
ALONGSIDE BERTHS\*\* : 13 class F.  
CRANES : Small floating shearlegs.  
STORAGE : General cargo: covered, about 400,000 sq. ft.; open, few areas subject to inundation. POL 60,000 bbl.  
CLEARANCE : None of the wharves have road or rail clearance. 2 surfaced highways and 1 unsurfaced highway clear port and connect with general road network; 1 single-track, standard gage line leads S. and connects with general rail network.  
LABOR : No information available.  
CAPACITY : 1,650 ST/day.

NAME : Wu-han.  
HARBOR : River harbor on Yangtze, fronting cities of Hankow, Han-yang, and Wu-ch'ang, about 1,100 km. from mouth; length 16 km.; width 1.2 km.; general depths 5.5 to 24 m., decreasing to controlling depth of 6 m.; principal facilities scattered along both sides of river with greatest concentration fronting Hankow.  
FAIRWAY LIMITATIONS: Controlling depth over bar at entrance to river 5.8 m. at chart datum, 9.1 m. at MHWN; controlling depths in river to Wu-han 8.8 m. during highest river level (July and Aug.) and 3 m. during lowest river level (Jan. through Mar.).  
ANCHORAGE\* : 2 class II and 4 class III in depths of 6 to 12 m.; mud bottom; good natural protection.  
FIXED MOORINGS\*\* : None.  
WHARFAGE : 2,700 m. suitable for transfer of general cargo; 1 POL pier; 2 shipyard wharves.  
ALONGSIDE BERTHS\*\* : 3 class C, 13 class D, 3 class E, 11 class F, and 1 class T-D.  
CRANES : Cargo: 2 small fixed wharf cranes. Shipyard: 6 portal jibs, 1 hammerhead and 2 automotive, all of undetermined capacities. Floating: several small shearlegs and 1 jib of undetermined capacities.  
STORAGE : General cargo: covered, 2,225,000 sq. ft.; open, large area near center of port, on E. bank of river, is served by rail and road and could be utilized for open stacking. POL 975,000 bbl.  
CLEARANCE : Most wharves have road and a few have rail clearance from roots of approaches; 2 surfaced and 2 unsurfaced highways clear port; 3 single-track and 1 double-track, standard gage, rail lines clear port. 2 bridges link cities of Hankow, Han-yang, and Wu-ch'ang: one, a highway bridge, crosses Han Chiang; the other, a rail/road bridge, crosses the Yangtze River.  
LABOR : No information available.  
CAPACITY : 4,950 ST/day.

NAME : Amoy (Hsia-men).  
HARBOR : Natural coastal harbor consisting of outer and inner harbors. Outer harbor, 11 km. long and 3.2 km. wide between 3-fathom depth curves with general depths of 13 to 29 m., is used for transfer of POL and anchorage. Inner harbor, about 3.2 km. long and 400 m. wide at narrowest point with water area of 1.25 sq. miles and general depths of 11.5 to 24 m., has general cargo wharves, naval facilities, and shipyards.

FAIRWAY LIMITATIONS: Berths, rather than fairways leading to them, limit the size of vessels accommodated.

ANCHORAGE\* : Outer harbor provides a large number of berths of all classes in depths of 12.8 to 29 m. over good holding ground of mud and sand; good protection from all directions. Inner harbor provides 1 class I, 3 class II, and 3 class III in depths of 6 to 18 m. over poor holding ground of soft mud; excellent natural protection.

FIXED MOORINGS\*\* : 1 class A.

WHARFAGE : 850 m. of principal wharfage suitable for transfer of general cargo; supplemental wharfage includes numerous piers, landing steps, beaches, and extensive amount of seawall suitable for landing personnel and equipment at high tide. 2 POL wharves on Sung-hsu Pan-tao.

ALONGSIDE BERTHS\*\* : 3 class D, 16 class F, 2 class T-C, and 1 class PT.

CRANES : None.

STORAGE : General cargo: covered, 370,000 sq. ft.; open, about 13 acres. POL 30,000 bbl.

CLEARANCE : Rail line close behind 4 wharves; truck access to shipside at 2 wharves, and to roots of approaches at remainder. 1 road and 1 single-track, standard gage rail line clear port to N. by means of causeway to mainland; road continues N. and joins general road network; rail leads W. by second causeway to mainland and connects with general rail network. Another road leads NW. from Sung-hsu Pan-tao POL terminal and connects with general road network.

LABOR : No information available.

CAPACITY : 8,250 ST/day.

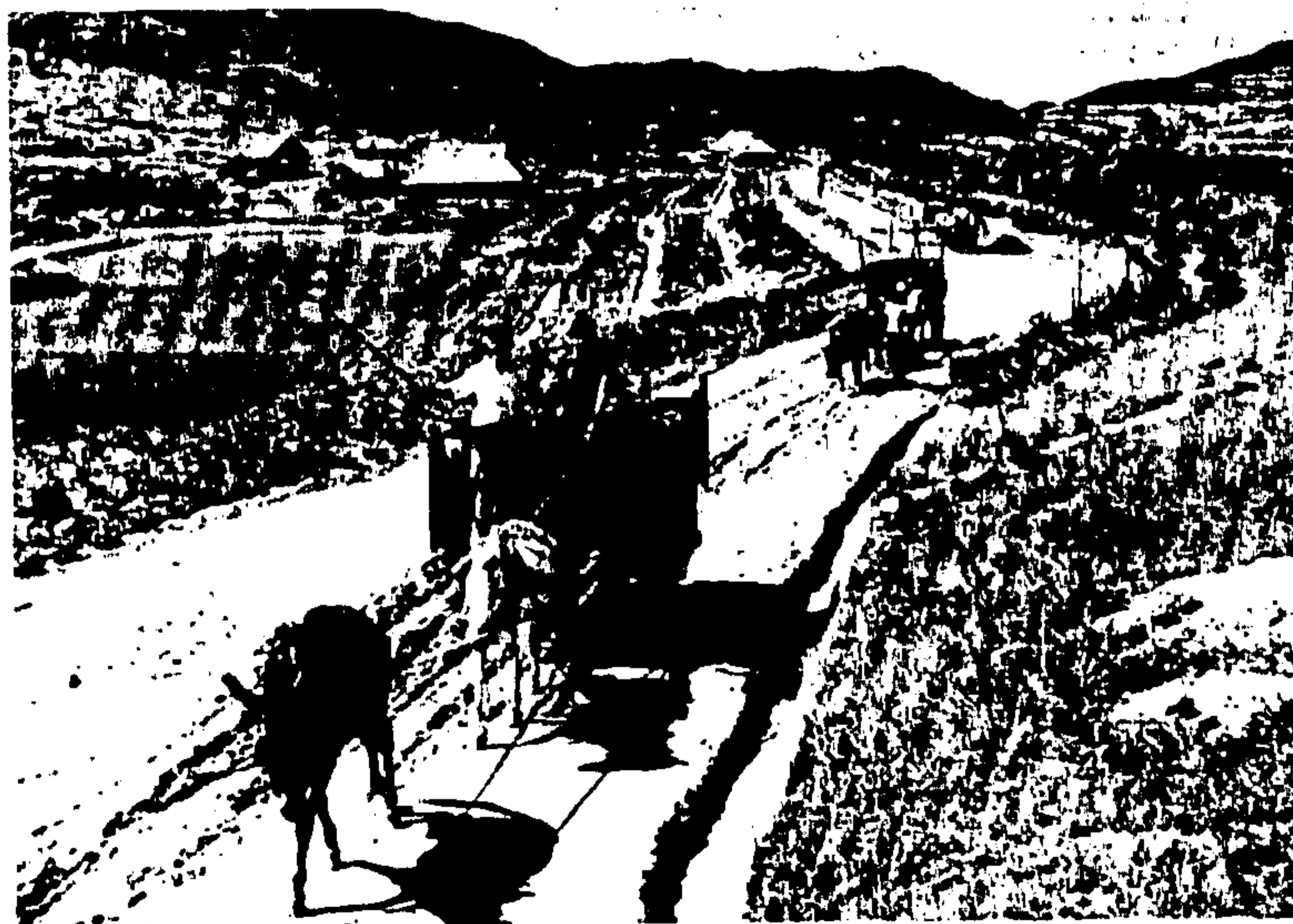


Figure 9. Unimproved earth road near Route 27, south of Canton. A large part of the road network consists of similar feeder roads, and a large part of the short-haul freight tonnage is transported in such vehicles. (U)

## (S) PORTS (Continued)

- : Canton (Kuang-chou)/Huang-pu.
- : Canton harbor, 64 km. above mouth of Chu Chiang river, has 4 divisions: Sterling Reach, 2.4 km. long and 150 to 275 m. wide; Nan Ho-tao, 4 km. long and 365 to 450 m. wide; Tung Ho-tao, 4 km. long and 150 to 425 m. wide; and Hsi-ho Tao, 2.4 km. long and 365 to 450 m. wide. All divisions have general depths less than 6 m.; the Hai-chu highway bridge across the Tung Ho-tao division restricts through navigation; facilities scattered throughout harbor with greatest concentration in the Nan Ho-tao division. Huang-pu harbor, 16 km. downstream from Canton, serves as deepwater harbor of complex; harbor is 3.2 km. long and 800 m. wide with general depths of 8.2 m.; commercial facilities are on north bank and naval base facilities on south bank along Ch'ang Chou (Dane's Island).
- TRWAY LIMITATIONS: Approach through dredged channel with controlling depth of 6.4 m. at chart datum, 8.2 m. at MLHW, upstream about 48 km. to Huang-pu harbor. Principal approach to Canton 16 km. further upstream through Blenheim Passage, a dredged channel with controlling depth of 4.2 m. at chart datum and 6 m. at MLHW, to S. end of Nan Ho-tao.
- CHORAGE\*: Several class II and III berths in depths of 7.6 to 9.1 m. in river below Huang-pu; several class III in Huang-pu harbor in general depths of 8 m.; good holding ground of mud and sand; good protection.
- XED MOORINGS\*\*: Probably available in part of Nan Ho-tao and Tung Ho-tao Harbor divisions in general depths of 6 m.
- ARFAGE: Canton: 3,825 m. suitable for transfer of general cargo; 5 wharves for POL transfer. Huang-pu: 2,130 m. suitable for transfer of general cargo; 2 sharves at shipyard and 4 at naval base.
- ONGSIDE BERTHS\*\*: Canton: 7 class D, 7 class E, 83 class F, and 5 class T-E. Huang-pu: 6 class B, 3 class D, 2 class E, 18 class F, and 4 class MSO.
- ANES: Canton: Several small fixed cargo cranes. Shipyard: 4 portal jibs est. capacities one 20-ton, two 5-ton, and one 1.5-ton; 1 bridge crane, est. capacity 5 tons; 1 guyed derrick; 4 floating cranes, one 50-ton shearlegs, one 20-ton jib, and two 15-ton jibs. Huang-pu: Six 5-ton portal jib cargo cranes; 1 floating jib crane, est. capacity 30 tons; several automotive and locomotive cranes, est. capacities 1 to 2 tons.
- ORAGE: Canton: General cargo: covered, 4,666,247 sq. ft.; open and bunk, 31.5 acres; materiel (military), 280,000 sq. ft.; refrigerated, 45,000 sq. ft. (est.). POL, 555,000 bbl. Huang-pu: General cargo: covered, 876,275 sq. ft.; open and bulk, 65 acres; materiel (Navy), about 90,000 sq. ft.; refrigerated, 197,400 sq. ft.
- IFARANCE: Only 2 wharves, the Huangsha Wharf No. 2 in Canton and the Main Wharf in Huang-pu, have rail facilities; about 1/3 of the wharves have truck access to shipside, the remainder have access to roots of approaches. Canton is cleared by 4 surfaced highways and 3 single-track, standard gage rail lines, all connecting with the general road and rail networks. Huang-pu is cleared by a surfaced highway and a single-track, standard gage rail line connecting with the general road and rail networks. 2 railroad/highway bridges, 1 crossing Sterling Reach and 1 crossing Hsi-ho Tao, connect Canton with Nuiku Sha (Belcher Island) to the W. and Nam-ho to the S.; the Hai-chu highway bridge crosses the Tung Ho-tao section about midway along its length. The port serves an extensive inland waterway system.
- ABOR: More than adequate labor supply available; efficiency good.
- APACITY: Total 14,200 ST/day: Canton 6,800 ST/day; Huang-pu 7,400 ST/day.

FOR

TRWAY LIMITATIONS:

CHORAGE\*

XED MOORINGS\*\*

ARFAGE

ONGSIDE BERTHS\*\*

ANES

ORAGE

IFARANCE

ABOR

APACITY

NAME : Fort Bayard (Chan Chiang).  
HARBOR : Natural harbor in N. part of Kuang-chou Wan consisting of outer and inner harbors. Outer harbor has general depths of 5.5 to 35 m., occupies 45 sq. miles; inner harbor has general depths of 1.8 to 32 m., occupies 5 sq. miles. Commercial facilities on W. side of inner harbor and naval facilities on opposite side.  
FAIRWAY LIMITATIONS: Controlling depth over bar about 27 km. SE. of port is 7.6 m. at chart datum, 10.6 m. at MLHW.  
ANCHORAGE\* : Large numbers of class II and III berths in outer harbor; depths 6 to 29 m.; good holding ground of mud; good protection.  
FIXED MOORINGS\*\* : None.  
WHARFAGE : 945 m. of principal wharfage and 760 m. of supplemental wharfage suitable for transfer of general cargo; 2 POL piers and 2 naval wharves.  
ALONGSIDE BERTHS\*\* : 2 class A, 1 class C, 2 class D, 3 class F, 1 class T-B, 1 class T-D, 2 class MSO, and 2 class PT.  
CRANES : 7 portal jibs, capacities 5 to 3 tons, and 1 steam-powered floating crane of 18 to 25 tons.  
STORAGE : General cargo: covered, 282,000 sq. ft.; open, about 6 acres. POL 487,500 bbl.  
CLEARANCE : Only main deepwater wharf has rail facilities; all have truck access to shipside. 3 surfaced highways clear port and connect with general road network; 1 single-track, standard gage line clears port NW. and connects with general rail network.  
LABOR : Labor force generally insufficient.  
CAPACITY : 5,600 ST/day.

\*Anchorage Berths:

Class	Diameter (meters)	Depth (meters)
I	732	11.6
II	457	9.1
III	274	6.1

\*\*Alongside and Fixed Mooring Berths:

Class	Length (meters)	Depth (meters)
A	172.2	9.5-9.1
B	140.2	8.8-7.0
C	106.7	6.7-5.5
D	76.2	5.2
E	61.0	4.0
F	30.5	2.1
T-B	160.0	9.5
T-C	137.2	7.9
T-D	76.2	4.3
T-E	53.3	2.7
DL	150.9	7.6
DE	94.5	6.7
SS	96.0	6.4
MSO	53.3	5.2
MSC	47.2	4.6
PT	32.0	3.0

Published LOC Studies

Ethiopia	Jan. 1962	Peru	Aug. 1964
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Angola	Mar. 1962	Southeast Asia (Rev.)	May 1965
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Egypt	June 1962	Spain	June 1965
Sudan	June 1962	El Salvador	June 1965
Guatemala	July 1962	Portugal	July 1965
Bolivia	Sep. 1962	Morocco	Aug. 1965
Ecuador	Sep. 1962	Uruguay	Sep. 1965
Venezuela	Nov. 1962	Gambia/Senegal	Nov. 1965
Honduras	Dec. 1962	Mali	Dec. 1965
Syria/Lebanon	Jan. 1963	Nigeria	Dec. 1965
India	Mar. 1963	Paraguay	Feb. 1966
Panama	Apr. 1963	Algeria	Mar. 1966
East Pakistan/NE. India	Apr. 1963	Indonesia (Java)	Apr. 1966
West Pakistan	May 1963	Tunisia	Apr. 1966
Afghanistan	June 1963	Burma (Rev.)	May 1966
Cuba (Rev.)	July 1963	Guinea/Portuguese Guinea/ Sierra Leone/Liberia	June 1966
Saudi Arabia/Kuwait	Aug. 1963	Denmark	July 1966
Brazil	Sep. 1963	Iran (Rev.)	Aug. 1966
Nicaragua	Oct. 1963	Dominican Republic/Haiti (Rev.)	Sep. 1966
Turkey	Nov. 1963	Iraq (Rev.)	Sep. 1966
Colombia	Dec. 1963	Malaya/Singapore	Oct. 1966
Jordan	Mar. 1964	French Guiana/Surinam/Guyana	Dec. 1966
Republic of the Congo (Rev.)	May 1964	Greece	Dec. 1966
Chile	June 1964		
Argentina	July 1964		

LOC SOUTH CHINA DATE OF INFORMATION JULY 1966

Additions, corrections, or requests for copies should be forwarded to DIA Production Center.

## (5) RAILROADS

### LINE 1. SHANGHAI - HSU-CHOU

Shanghai - Nanking (311 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 0.7%; MAX. AXLELOAD 23 ST\*. BRIDGES, 113 totaling 1,205 m., longest 55 m. at km. 58.7. TUNNELS, 2 totaling 895 m., longer 490 m. at km. 301. PASSING TRACKS: Max. interval 11 km., Min. length 543 m. CAPACITIES (ST/day): Line 12,200; Shanghai yard 21,000, Nanking yard 30,000. Rail ferry across Yangtze operates 3 craft with total capacity of 22,000 ST/day.

P'u-k'ou - Suchow (340 km.)  
GAGE 1.435 m.; NO. TRACKS, 2 to Pang-fou (175 km.), remainder 1; MAX. GRADE 0.5%; MAX. AXLELOAD 23 ST\*. BRIDGES, 141 totaling 6,032 m., longest 567 m. at km. 183. PASSING TRACKS: Max. interval 11 km., Min. length 500 m. CAPACITIES (ST/day): Line (controlled by single-track sector) 11,700; P'u-k'ou yard 11,700, Hsu-chou yard 67,000.

### LINE 2. NANKING - WU-HU (131 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 0.7%; MAX. AXLELOAD 23 ST\*. BRIDGES, 4 of over 30 m. totaling 287 m., longest 158 m. at km. 103. PASSING TRACKS: Max. interval 16 km., Min. length 366 m. CAPACITIES (ST/day): Line 5,300; Nanking yard 30,000, Wu-hu yard 5,300.

### LINE 3. SHANGHAI - CHU-CHOU

Shanghai - Ying-t'an (682 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 50 totaling 5,509 m., longest 1,068 m. at km. 189. PASSING TRACKS: Max. interval 13 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 8,000; Shanghai yard 21,000, Ying-t'an yard 20,000.

Ying-t'an - Hsiang-t'ang (115 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 16 totaling 1,224 m., longest 491 m. at km. 107. PASSING TRACKS: Max. interval 14 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 6,250; Hsiang-t'ang yard 20,000.

Hsiang-t'ang - Chu-chou (339 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 12 of over 60 m. totaling 1,872 m., longest 540 m. at km. 62.9. PASSING TRACKS: Max. interval 14 km., Min. length 500 m.\* CAPACITIES (ST/day): Line, 6,250, Chu-chou yard 26,000.

### LINE 4. HSIANG-T'ANG - CHIU-CHIANG (163 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 15 totaling 1,195 m., longest 661 m. at km. 19. PASSING TRACKS: Max. interval 20 km., Min. length 500 m. CAPACITIES (ST/day): Line 7,150; Hsing-t'ang yard 20,000, Chiu-Chiang yard 7,200.

### LINE 5. YING-T'AN - FOOCHOW

Ying-t'an - Wang-t'ai (289 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 2.2%; MAX. AXLELOAD 23 ST\*. BRIDGES, 40 totaling 2,874 m., longest 320 m. at km. 286.5. TUNNELS, 16 totaling 3,170 m., longest 811 m. at km. 89.2. PASSING TRACKS: Max. interval 20 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 5,000; Ying-t'an yard 20,000, Wang-t'ai yard 14,000.

Wang-t'ai - Foochow (190 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.5%; MAX. AXLELOAD 23 ST\*. BRIDGES, 45 totaling 3,973 m., longest 494 m. at km. 309. TUNNELS, 4 totaling 871 m., longest 314 m. at km. 104. PASSING TRACKS: Max. interval 23 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 3,600; Foochow yard 3,600.

### LINE 6. AMOY - WANG-T'AI (405 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.5%; MAX. AXLELOAD 23 ST\*. BRIDGES, 94 totaling 5,596 m., longest 251 m. at km. 124. TUNNELS, 30 totaling 7,111 m., longest 838 m. at km. 198.7. PASSING TRACKS: Max. interval 28 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 5,300; Amoy yard 5,300, Wang-t'ai yard 14,000.

### LINE 7. CANTON - PAO-AN (146 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 0.8%; MAX. AXLELOAD 23 ST\*. BRIDGES, 32 totaling 1,378 m., longest 296 m. at km. 67.9. PASSING TRACKS: Max. interval 12 km., Min. length 305 m. CAPACITIES (ST/day): Line 6,100; Canton yard 15,000, Pao-an yard 6,100.

### LINE 8. CANTON - CHENG-CHOU

Canton - Heng-yang (552 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 57 totaling 1,165 m., longest 256 m. at km. 234. TUNNELS, 21 totaling 3,201 m., longest 425 m. at km. 254.3. PASSING TRACKS: Max. interval 14.5 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 8,100; Canton yard 15,000, Heng-yang yard 28,000.

Heng-yang - Chu-chou (134 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 17 totaling 1,711 m., longest 440 m. at km. 5.1. TUNNELS, 1 of 110 m. at km. 46.8. PASSING TRACKS: Max. interval 10 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 10,700, Chu-chou yard 26,000.

Chu-chou - Wu-ch'ang (409 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 52 totaling 3,219 m., longest 439 m. at km. 286. PASSING TRACKS: Max. interval 11 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 9,000; Wu-Ch'ang yard 35,000.

Wu-ch'ang - Cheng-chou (534 km.)  
GAGE 1.435 m.; NO. TRACKS, 2; MAX. GRADE 1.5%; MAX. AXLELOAD 23 ST\*. BRIDGES, 206 totaling 6,623 m., longest 1,167 m. at km. 2. TUNNELS, 1 of 299 m. at km. 187.4. PASSING TRACKS: Max. interval 12 km. (signal blocks). CAPACITIES (ST/day): Line 22,150; Cheng-chou 77,000.

LINE 9. HENG-YANG - P'ING-HSIANG

Heng-yang - Liu-chou (538 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.4% going, 1.1% returning; MAX. AXLELOAD 23 ST\*. BRIDGES, 160 totaling 4,501 m., longest 616 m. at km. 537. PASSING TRACKS: Max. interval 16 km., Min. length 500 m.\* CAPACITIES (ST/day): Line (governed by length of passing tracks) 8,650; Heng-yang yard 28,000, Liu-chou yard 21,000.

Liu-chou - Li-t'ang (135 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%; MAX. AXLELOAD 23 ST\*. BRIDGES, 9 totaling 478 m., longest 366 m. at km. 70. PASSING TRACKS: Max. interval 15 km., Min. length 570 m. CAPACITIES (ST/day): Line 7,150; Li-t'ang yard 20,000.

Li-t'ang - P'ing-hsiang (340 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 2%; MAX. AXLELOAD 23 ST\*. BRIDGES, 17 totaling 1,333 m., longest 393 m. at km. 120.7. TUNNELS, 1 of 229 m. at km. 295. PASSING TRACKS: Max. interval 16 km., Min. length 570 m. CAPACITIES (ST/day): Line 6,500; P'ing-hsiang yard 8,200.

LINE 10. FORT BAYARD - LI-T'ANG (315 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 0.5%; MAX. AXLELOAD 23 ST\*. BRIDGES, 50\* totaling 2,600 m., longest 320 m.\* at km. 259. TUNNELS, 1 of 107 m.\* at km. 218. PASSING TRACKS: Max. interval 25 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 5,600; Fort Bayard yard 5,600, Li-t'ang yard 20,000.

LINE 11. LIU-CHOU - K'UN-MING

Liu-chou - Kuei-yang (599 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 2.7%; MAX. AXLELOAD 23 ST\*. BRIDGES, 164 totaling 5,378 m., longest 247 m. at km. 102.4. TUNNELS, 55 totaling 14,237 m., longest 1,830 m.\* at km. 525. PASSING TRACKS: Max. interval 17 km., Min. length 420 m. CAPACITIES (ST/day): Line 4,500; Liu-chou yard 21,000, Kuei-yang yard 21,000.

Kuei-yang - K'un-ming (675 km.)\*  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.5%; MAX. AXLELOAD 23 ST\*. BRIDGES (data unavailable). TUNNELS, 149 totaling 65,100 m.\*, longest 4,070. PASSING TRACKS: Max. interval 13 km., Min. length 640 m. CAPACITIES (ST/day): Line 10,000; K'un-ming yard 15,000.

LINE 12. K'UN-MING - HO-K'OU (469 km.)

GAGE 1 m.; NO. TRACKS, 1; MAX. GRADE 2.5%; MAX. AXLELOAD 12 ST\*. BRIDGES, 31 totaling 1,714 m., longest 136 m. at km. 386.5. TUNNELS, 59 totaling 11,477 m., longest 587 m. at km. 198.5. PASSING TRACKS: Max. interval 16 km., Min. length 240 m. CAPACITIES (ST/day): Line 2,400; Ho-k'ou (Lao Cai) yard 5,000.

LINE 13. KUEI-YANG - HSIAO-NAN-HAI (438 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 2.3%; MAX. AXLELOAD 23 ST\*. BRIDGES (No. unknown, longest 820 m. at km. 436. TUNNELS 54 totaling 21,800 m.\*, longest 4,270 m. at km. 238. PASSING TRACKS: Max. interval 15 km., Min. length 800 m. CAPACITIES (ST/day): Line 6,000; Kuei-yang yard 21,000, Chungking yard, 33 km. N. of Hsiao-nan-hai, 14,000.

LINE 14. CHUNGKING - PAO-CHI

Chungking - Nei-chiang (285 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.25%; MAX. AXLELOAD 23 ST\*. BRIDGES, 10 of over 150 m. totaling 936 m., longest 350 m. at km. 278. TUNNELS, 17 totaling 1,852 m., longest 279 m. at km. 36. PASSING TRACKS: Max. interval 11 km., Min. length 610 m. CAPACITIES (ST/day): Line 7,200; Chungking yard 14,000, Nei-chiang 20,000.

Nei-chiang - Ch'eng-tu (216 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.3%; MAX. AXLELOAD 23 ST\*. BRIDGES, 12 of over 50 m. totaling 1,490 m., longest 600 m. at km. 94. TUNNELS, 11 totaling 1,508 m., longest 480 m. at km. 60. PASSING TRACKS: Max. interval 11 km., Min. length 610 m. CAPACITIES (ST/day): Line 7,200; Ch'eng-tu yard 14,000.

Ch'eng-tu - Pao-chi (672 km.)  
GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1%\*; MAX. AXLELOAD 23 ST\*. BRIDGES, 995 totaling 26,748 m., longest 390 m. at km. 670. TUNNELS, 304 totaling 84,413 m., longest 2,366 m. at km. 632. PASSING TRACKS: Max. interval 17 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 6,300; Pao-chi yard 14,000. Electrified between Feng-chou and Pao-chi.

LINE 15. NEI-CHIANG - I-PIN (117 km.)

GAGE 1.435 m.; NO. TRACKS, 1; MAX. GRADE 1.5% going, 2% returning; MAX. AXLELOAD 23 ST\*. BRIDGES, 2 known totaling 535 m., longer 351 m. at I-pin. PASSING TRACKS: Max. interval 13 km., Min. length 500 m.\* CAPACITIES (ST/day): Line 5,400 going, 4,000 returning; Nei-chiang yard 20,000, I-pin yard 5,400.

\*Estimated

## (6) HIGHWAYS

Highways treated in this study are listed by indigenous route numbers.

### ROUTE 13. YA-AN - CH'ENG-TU (150 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: 6 totaling 981 m., longest 250 m. at km. 58. Min. Clearances: Horiz. 6.1 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement.

### ROUTE 15. CH'ENG-TU - SHENSI PROVINCE BORDER

#### Ch'eng-tu - Mien-yang (121 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 8 totaling 966 m., longest 247 m. at km. 49. Min. Clearances: Horiz. 4 m., Vert. unlimited. CAPACITY (ST/day): Max. 2,150, Min. 700. Flat alinement.

#### Mien-yang - Shensi Province Border (196 km.)

SURFACE: Type, gravel; Width 4.5-5.4 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 2 totaling 335 m., longer 183 m. at km. 1. Min. Clearances: Horiz. 2.4 m., Vert. unlimited. CAPACITY (ST/day): Max. 850, Min. 150. Mountainous alinement. Ferry crosses Fou Chiang, about 300 m., and Chia-ling Chiang and Pai-lung Chiang, about 120 m. each.

### ROUTE 16. CH'ENG-TU - KANSU PROVINCE BORDER

#### Ch'eng-tu - Hung-yuan (507 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: unknown. CAPACITY (ST/day): Max. 850, Min. 150. Mountainous alinement.

#### Hung-yuan - Kansu Province Border (206 km.)

SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: unknown. CAPACITY (ST/day): Max. 550, Min. 100. Mountainous alinement.

### ROUTE 17. KUEI-YANG - CH'ENG-TU

#### Kuei-yang - Chi-chiang (328 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 3 totaling 343 m., longest 137 m. at km. 82. Min. Clearances: Horiz. 5 m., Vert. unlimited. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement. 4 narrow sections (3.3-3.6 m.) with steep grades and sharp curves.

#### Chi-chiang - Chungking (93 km.)

SURFACE: Type, improved earth; Width 5.5-6 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 850, Min. 300. Mountainous alinement. Ferry across Yangtze, 805-m. water gap.

#### Chungking - Pi-shan (51 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 1 of 177 m. at km. 104. Min. Clearances: Horiz. 6.1 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement.

#### Pi-shan - Sui-ning (142 km.)

SURFACE: Type, improved earth; Width, 4.5-5.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 1 of 177 m. at km. 104. Min. Clearances: Horiz. 6.1 m., Vert. unlimited. CAPACITY (ST/day): Max. 850, Min. 150. Hilly alinement.

#### Sui-ning - Ch'eng-tu (187 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,150, Min. 400. Hilly alinement. One ferry over To Chiang, approx. 135-m. crossing.

### ROUTE 18. NAN-HUA - YA-AN

#### Nan-hua - Hsi-ch'ang (386 km.)

SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: unknown. CAPACITY (ST/day): Max. 550, Min. 100. Mountainous alinement. Ferry over Chin-sha Chiang, approx. 305-m. crossing.

#### Hsi-ch'ang - Ya-an (193 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: No. unknown, longest 198 m. at km. 193. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement. Slippery grades and sharp curves on mountain north of Han-yuan.

### ROUTE 19. CHINA/BURMA BORDER - HENG-YANG

#### China/Burma Border - Lu-hsi (77 km.)

SURFACE: Type, improved earth; Width 5.5-6 m., Cond. good; Shoulders 0-1 m. wide. BRIDGES: 2 totaling 80 m., longer 50 m. at km. 31. Min. Clearances: Horiz. 5 m., Vert. unknown. CAPACITY (ST/day): Max. 1,300, Min. 450. Hilly alinement. One short section of steep grades near the border.

#### Lu-hsi - Mi-tu (404 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 11 totaling 952 m., longest 152 m. at km. 198. Min. Clearances: Horiz. 3.7 m., Vert. unknown. CAPACITY (ST/day): Max. 1,150, Min. 400. Mountainous alinement. Several sections of hairpin curves.

#### Mi-tu - K'un-ming (274 km.)

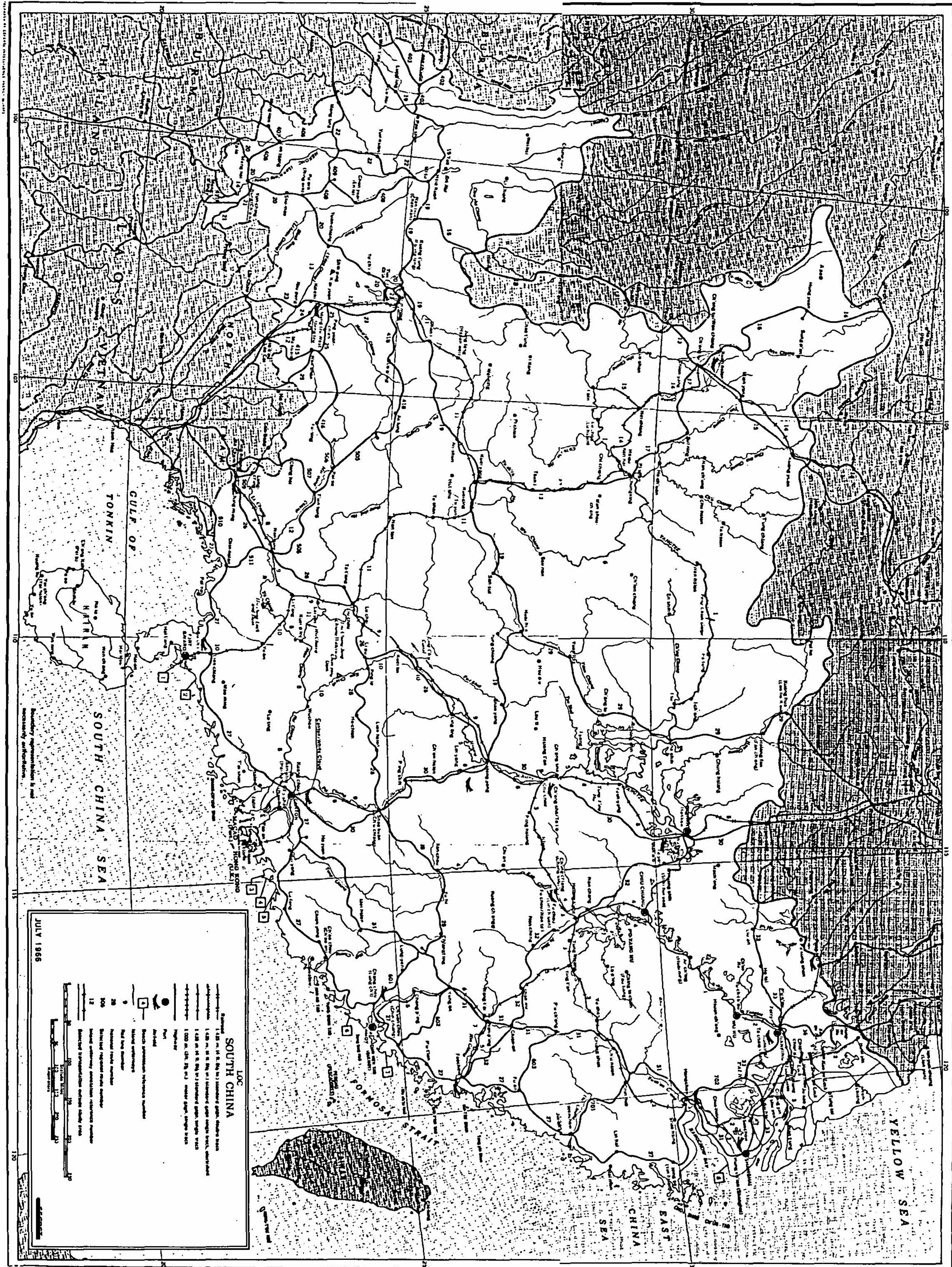
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 3 totaling 98 m., longest 38 m. at km. 60. Min. Clearances: Horiz. 6.1 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement. Short stretches of sharp curves and steep grades.

#### K'un-ming - Chan-i (185 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 67 m. at km. 103. Min. Clearances: Horiz. 8 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,700, Min. 550. Hilly alinement.

#### Chan-i - Kuei-yang (394 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 7 totaling 404 m., longest 77 m. at km. 2. Min. Clearances: Horiz. 3.7 m., Vert. unknown. CAPACITY (ST/day): Max. 1,150, Min. 400. Mountainous alinement.



## (S) HIGHWAYS (Continued)

Kuei-yang - Huai-hua (431 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. fair; Shoulders 0-1 m. wide. BRIDGES:  
9 totaling 961 m., longest 183 m. at km. 415.  
Min. Clearances: Horiz. 3.7 m., Vert. unlim-  
ited. CAPACITY (ST/day): Max. 1,100, Min.  
200. Hilly alinement.

Huai-hua - Heng-yang (349 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. fair; Shoulders 0-1 m. wide. BRIDGES:  
9 totaling 819 m., longest 229 m. at km. 212.  
Min. Clearances: Horiz. 3.6 m., Vert. unlim-  
ited. CAPACITY (ST/day): Max. 850, Min.  
150. Mountainous alinement. 520-m. ferry  
crossing over Yuan Chiang.

### ROUTE 20. CHINA/BURMA BORDER TO K'UN- MING

China/Burma Border - Ch'e-li (108 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. good; Shoulders 0-0.6 m. wide. BRIDGES:  
6 totaling 237 m., longest 61 m. at km. 1.  
Min. Clearances: Horiz. 3.7 m., Vert. unlim-  
ited. CAPACITY (ST/day): Max. 1,350, Min.  
450. Hilly alinement. 335-m. causeway lo-  
cated at km. 63.

Ch'e-li - Ssu-mao (121 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond.  
good; Shoulders 0-0.6 m. wide. BRIDGES: 2  
totaling 381 m., longer 335 m. at km. 2.  
Min. Clearances: Horiz. 5.5 m., Vert. un-  
limited. CAPACITY (ST/day): Max. 1,550,  
Min. 500. Hilly alinement.

Ssu-mao - Yuan-chiang (200 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond.  
good; Shoulders 0-0.6 m. wide. BRIDGES: 4  
totaling 274 m., longest 107 m. at km. 96.  
Min. Clearances: Horiz. 4.8 m., Vert. un-  
limited. CAPACITY (ST/day): Max. 1,150,  
Min. 400. Mountainous alinement.

Yuan-chiang - Yu-ch'i (109 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. good; Shoulders 0-0.6 m. wide. BRIDGES:  
5 totaling 303 m., longest 113 m. at km. 6.  
Min. Clearances: Horiz. 6 m., Vert. unlim-  
ited. CAPACITY (ST/day): Max. 1,000, Min.  
350. Mountainous alinement.

Yu-ch'i - Jct. Route 23 (90 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond.  
good; Shoulders 0-0.6 m. wide. BRIDGES:  
none. CAPACITY (ST/day): Max. 1,900, Min.  
650. Flat alinement.

### ROUTE 23. CHINA/N. VIETNAM BORDER - JCT. ROUTE 20

China/N. Vietnam Border - Niu-peng Area  
(72 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. good; Shoulders 0-0.6 m. wide. BRIDGES:  
2 totaling 275 m., longer 229 m. near Niu-  
peng. Min. Clearances: Horiz. 6.7 m., Vert.  
unlimited. CAPACITY (ST/day): Max. 1,000,  
Min. 350. Mountainous alinement. At least  
one section of hairpin curves.

Niu-peng Area - K'ai-yuan (109 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.;  
Cond. good; Shoulders 0-0.6 m. wide. BRIDGES:  
1 of 69 m. at km. 104. Min. Clearances:  
Horiz. 7.6 m., Vert. unlimited. CAPACITY  
(ST/day): Max. 850, Min. 300. Mountainous  
alinement. At least one section of hairpin  
curves.

K'ai-yuan - Jct. Route 20 (209 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. good; Shoulders 0-0.6 m. wide. BRIDGES:  
2 totaling 363 m., longer 189 m. at km. 12.  
Min. Clearances: Horiz. 5.5 m., Vert. un-  
limited. CAPACITY (ST/day): Max. 1,350,  
Min. 450. Hilly alinement.

### ROUTE 24. CHINA/N. VIETNAM BORDER - JCT. ROUTE 23 (158 km.)

SURFACE: Type, gravel; Width 3.6-4.5 m.;  
Cond. fair; Shoulders 0-1 m. wide. BRIDGES:  
1 of 119 m. at Lao Cai. Min. Clearances:  
Horiz. 4.6 m., Vert. unlimited. CAPACITY  
(ST/day): Max. 700, Min. 150. Mountainous  
alinement. Several sections of hairpin  
curves. Several temporary fords still in  
use.

### ROUTE 25. CHINA/N. VIETNAM BORDER - K'AI-YUAN

China/N. Vietnam Border - Wen-shan (106 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.;  
Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES:  
1 of 76 m. at km. 1. Min. Clearances: Horiz.  
7 m., Vert. unlimited. CAPACITY (ST/day):  
Max. 700, Min. 150. Mountainous alinement.  
Two sections of hairpin curves.

Wen-shan - Ping-yuan-chieh (100 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. good; Shoulders 0-0.6 m. wide. BRIDGES:  
none. CAPACITY (ST/day): Max. 1,350, Min.  
450. Hilly alinement.

Jct. Route 23 - K'un-ming (23 km.)  
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,750, Min. 550. Undulating alinement.

ROUTE 21. CHINA/LAOS BORDER - JCT.  
ROUTE 20 (145 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 3 totaling 219 m., longest 101 m. at km. 100. Min. Clearances: Horiz. 6.1 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,000, Min. 350. Mountainous alinement.

ROUTE 22. CHINA/BURMA BORDER - MI-TU

China/Burma Border - Meng-ting (23 km.)  
SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 550, Min. 100. Mountainous alinement.

Meng-ting - Yun-hsien (258 km.)  
SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 9 totaling 457 m., longest 101 m. at km. 57. Min. Clearances: Horiz. 3.7 m., Vert. unlimited. CAPACITY (ST/day): Max. 850, Min. 300. Mountainous alinement.

Yun-hsien - Jct. Route 408 (122 km.)  
SURFACE: Type, gravel; Width 5.5-7.3 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 4 totaling 238 m., longest 105 m. at km. 60. Min. Clearances: Horiz. 44.9 m., Vert. unknown. CAPACITY (ST/day): Max. 1,150, Min. 400. Mountainous alinement.

Jct. Route 408 - Mi-tu (51 km.)  
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 146 m. at km. 2. Min. Clearances: Horiz. 7.6 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement.

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 61 m. at km. 67. Min. Clearances: Horiz. 7.3 m., Vert. unlimited. CAPACITY (ST/day): Max. 850, Min. 300. Mountainous alinement.

ROUTE 26. CHINA/N. VIETNAM BORDER -  
HENG-YANG

China/N. Vietnam Border - Nan-ning (227 km.)  
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 2 totaling 623 m., longer 361 m. at km. 224. Min. Clearances: Horiz. 8.5 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement.

Nan-ning - Heng-yang (871 km.)  
SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 25 totaling 1,527 m., longest 90 m. at km. 27. Min. Clearances: Horiz. 3.3 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement. 7 ferries with crossings of 90-365 m.

ROUTE 27. CHINA/N. VIETNAM BORDER -  
HANGCHOW

China/N. Vietnam Border - Lien-chiang (330 km.)  
SURFACE: Type, gravel; Width 4.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 19 totaling 1,963 m., longest 259 m. at km. 292. Min. horiz. Clearance 4.5 m. CAPACITY (ST/day): Max. 1,700, Min. 500. Undulating alinement. 2 ferries SW. of Chin-hsien, 128 and 335-m. crossings.

(5) HIGHWAYS (Continued)

Lien-chiang - Canton (483 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 54 totaling 6,240 m., longest 410 m. at km. 479. Min. Clearances: Horiz. 3.0 m., Vert. prob. unlimited. CAPACITY (ST/day): Max. 1,950, Min. 650. Undulating alinement. 3 ferry crossings in delta area near Canton, 1,510, 594, and 533 m. wide. 2 causeways 290 and 230 m. long over tidal flats. 7 ferries replaced by bridges in recent years.

Canton - Foochow (966 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 91 totaling 10,168 m., longest 840 m. at km. 795. Min. Horiz. Clearance 3.0 m. CAPACITY (ST/day): Max. 1,950, Min. 650. Undulating alinement. Ferry crossings at Hui-yang (365 m.) and Foochow (1,000 m.).

Foochow - Wenchow (333 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 20 totaling 1,709 m., longest 189 m. at km. 95. Min. Clearances: Horiz. prob. 3.7 m., Vert. prob. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement. 3 ferry crossings, approx. 640, 500, and 665 m.

Wenchow - Hangchow (502 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 21 totaling 1,147 m., longest 213 m. at km. 150. CAPACITY (ST/day): Max. 1,950, Min. 650. Undulating alinement. Ferry over Ou Chiang, approx. 305 m.; 3 ferries with crossing widths of 580, 305, and 90 m.

ROUTE 28. LI-PU - JCT. ROUTE 31

Li-pu - Ho-chieh (137 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 12 totaling 841 m., longest 142 m. at km. 136. Min. Horiz. Clearance 4.2 m. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement. 274-m. ferry crossing over Kuei Chiang crossings.

Ho-chieh - Shao-kuan (285 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 5 totaling 714 m., longest 296 m. at km. 105. Min. Horiz. Clearance 4 m. CAPACITY (ST/day): Max. 850, Min. 150. Mountainous alinement. Road being improved.

Shao-kuan - Yu-tu (270 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. fair-good; Shoulders 0-0.6 m. wide. BRIDGES: 15 totaling 1,532 m., longest 560 m. at km. 216. Min. Horiz. Clearance 4.5 m. CAPACITY (ST/day): Max. 1,300, Min. 250. Hilly alinement.

Yu-tu - Jct. Route 31 (190 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 11 totaling 621 m., longest 102 m. at km. 76. Min. Horiz. Clearance 3.6. CAPACITY (ST/day): Max. 1,350, Min. 450. Hilly alinement. 610-m. ferry crossing over the Kung Shui and 220-m. ferry crossing at km. 24.

ROUTE 30. CANTON - HONAN BORDER

Canton - P'ing-shih (407 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 24 totaling 1,745 m., longest 256 m. at km. 70. Min. Horiz. Clearance 3.6 m. CAPACITY (ST/day): Max. 1,300, Min. 450. Mountainous alinement.

P'ing-shih - Heng-yang (211 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: 7 totaling 782 m., longest 485 m. at km. 211. CAPACITY (ST/day): Max. 1,700, Min. 550. Hilly alinement. Ferry at Lei-yang, 260-m. crossing.

Heng-yang - Ch'ang-sha (177 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: 7 totaling 1,453 m., longest 634 m. at km. 130. Min. Clearances: Horiz. 3 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,700, Min. 550. Undulating alinement.

Ch'ang-sha - Wu-han (386 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: 13 totaling 1,341 m., longest 240 m. at km. 190. Min. Clearances: Horiz. 2.4 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement.

Wu-han - Honan Border (193 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 8 totaling 1,979 m., longest 1,152 m. at km. 1. TUNNELS: 1 of 41 m. at km. 192. Min. Horiz. Clearance 5.5 m. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement.

ROUTE 31. JCT. ROUTE 27 - SHANGHAI

Jct. Route 27 - Chien-ou (763 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 58 totaling 3,812 m., longest 503 m. at km. 180. Min. Clearances: Horiz. 3 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement. 2 ferries, 185- and 200-m. crossings.

Chien-ou - Chiang-shan (214 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 6 totaling 409 m., longest 222 m. at km. 60. Min. Horiz. Clearance 4 m. CAPACITY (ST/day): Max. 1,300, Min. 340. Mountainous alinement.

Chiang-shan - Hangchow (304 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 wide. BRIDGES: 9 totaling 788 m., longest 229 m. at km. 130. CAPACITY (ST/day): Max. 1,550, Min. 500. Hilly alinement. 2 ferries, approx. 120-m. and 150-m. crossings. 244-m. causeway at km. 36.

Hangchow - Shanghai (209 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 30 m. at km. 209. Min. Clearances: Horiz. 7.9 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,950, Min. 650. Undulating alinement. Approx. 350-m. ferry crossing over the Huang-pu Chiang.

ROUTE 29. HUAI-HUA - HONAN BORDER

Huai-hua - Ch'ang-te (291 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. fair; Shoulders 0-0.6 m. wide.

BRIDGES: 5 totaling 271 m., longest 76 m.  
at km. 84. Min. Horiz. Clearance prob. 4 m.  
CAPACITY (ST/day): Max. 1,100, Min. 200.  
Hilly alinement. Ferry over Yuan Chiang,  
approx. 405-m. crossing; 2 other probable  
ferries, crossings est. 150 m.

Ch'ang-te - Sha-shih (229 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. fair; Shoulders 0-1 m. wide. BRIDGES:  
1 over 90 m. at km. 50. CAPACITY (ST/day):  
Max. 1,250, Min. 250. Undulating alinement.  
5 ferries, 150-915 m., including a 915-m.  
ferry across Yangtze at Sha-shih.

Sha-shih - Honan Border (245 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.;  
Cond. fair; Shoulders 0-0.6 m. wide.  
BRIDGES: 1, length 55 m. at km. 155.  
CAPACITY (ST/day): Max. 1,250, Min. 250.  
Undulating alinement. 524-m. ferry crossing  
over Han Chiang.

ROUTE 32. FOOCHOW - WU-HAN

Foochow - Chien-ou (200 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond.  
good; Shoulders 0-0.6 m. wide. BRIDGES: 11  
totaling 925 m., longest 219 m. at km. 199.  
Min. Horiz. Clearance 3.3 m. CAPACITY (ST/  
day): Max. 1,300, Min. 450. Mountainous  
alinement.

Chien-ou - Nan-cheng (253 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond.  
good; Shoulders 0-0.6 m. wide. BRIDGES: 10  
totaling 1,236 m., longest 530 m. at km. 253.  
Min. Clearances: Horiz. 2.4 m., Vert. un-  
known. CAPACITY (ST/day): Max. 1,750, Min.  
550. Hilly alinement. 2 ferries with 75-m.  
crossings.

Nan-cheng - Nan-chang (185 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond.  
fair; Shoulders 0-0.6 m. wide. BRIDGES: 6  
totaling 959 m., longest 490 m. at km. 117.  
CAPACITY (ST/day): Max. 1,450, Min. 300.  
Undulating alinement.

## (S) HIGHWAYS (Continued)

Nan-chang - Wu-han (362 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 2 totaling 1,030 m., longer 1,000 m. at km. 1. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement. Ferry crossing, approx. 150 m. 2 causeways.

### ROUTE 33. SHANGHAI - HONAN BORDER

Shanghai - Jct. Route 702 (196 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 12 totaling 540 m., longest 67 m. at km. 45. Min. clearances: Horiz. prob. 5.5 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,950, Min. 650. Undulating alinement.

Jct. Route 702 - Nanking (156 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,700, Min. 550. Undulating alinement.

Nanking - Ho-fei (175 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,250, Min. 250. Undulating alinement. Combination highway/railroad bridge under construction in 1966 will replace 990-m. ferry at km. 6 over Yangtze.

Ho-fei - Honan Border (97 km.)

SURFACE: Type, improved earth; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 30 m. at km. 80. CAPACITY (ST/day): Max. 950, Min. 200. Undulating alinement.

### ROUTE 36. NANKING - HUAI-YANG (177 km.)

SURFACE: Type, gravel; Width 6.4-7 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 50 m. at km. 135. CAPACITY (ST/day): Max. 1,600, Min. 300. Undulating alinement. Prob. ferry over the Huai Ho; ferry over the Nan-shan Ho.

Meng-lien - Lan-tsang (48 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement.

### ROUTE 408. NING-ERH - JCT. ROUTE 22 (295 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 7 totaling 449 m., longest 158 m. at Ching-ku. Min. Clearances: Horiz. 4.6 m., Vert. unlimited. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement.

### ROUTE 409. JCT. ROUTE 408 - JCT. ROUTE 22 (97 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 3 totaling 231 m., longest 107 m. at km. 83. Min. Clearances: Horiz. 3.7 m., Vert. unknown. CAPACITY (ST/day): Max. 1,000, Min. 350. Mountainous alinement.

### ROUTE 411. CHINA/LAOS BORDER - JCT. ROUTE 21

China/Laos Border - Meng-p'eng (37 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 2 totaling 196 m., longer 130 m. at km. 32. Min. Clearances: Horiz. 7 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement.

Meng-p'eng - Jct. Route 21 (48 km.)

SURFACE: Type, improved earth; Width 4.5-5.2 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 750, Min. 250. Mountainous alinement.

### ROUTE 415. CHINA/N. VIETNAM BORDER - WEN-SHAN

China/N. Vietnam Border - Ma-kuan (53 km.)

SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 550, Min. 100. Mountainous alinement.

ROUTE 402. CHINA/BURMA BORDER - JCT.  
ROUTE 19

China/Burma Border - T'eng-ch'ung (61 km.)  
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,150, Min. 400, except for an 8-km. section of unimproved earth, 2.4 m. wide and in poor condition, at the border with max. and min. capacities of 100 and 0 ST/day. Mountainous alinement.

T'eng-ch'ung - Jct. Route 19 (150 km.)  
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 3 totaling 387 m., longest 183 m. at km. 22. Min. Clearances: Horiz. 3.7 m., Vert. unknown. CAPACITY (ST/day): Max. 1,150, Min. 400. Mountainous alinement.

ROUTE 403. CHINA/BURMA BORDER -  
T'ENG-CH'UNG (129 km.)

SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. good; Shoulders 0-1 m. wide. BRIDGES: 3 totaling 417 m., longest 213 m. at km. 46. Min. Clearances: Horiz. 3 m., Vert. unknown. CAPACITY (ST/day): Max. 850, Min. 300. Hilly alinement. An 8-km. section at the border is not motorable.

ROUTE 406. MENG-HAI - JCT. ROUTE 22

Meng-hai - Lan-tsang (97 km.)  
SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,150, Min. 400. Mountainous alinement.

Lan-tsang - Jct. Route 22 (113 km.)  
SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 43 m. at km. 112. Min. Clearances: Horiz. 3.7 m., Vert. unknown. CAPACITY (ST/day): Max. 850, Min. 300. Mountainous alinement.

ROUTE 407. CHINA/BURMA BORDER - LAN-TSANG

China/Burma Border - Meng-lien (32 km.)  
SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. poor; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 450, Min. none. Mountainous alinement.

Ma-kuan - Wen-shan (58 km.)  
SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 91 m. at km. 50. Min. Clearances: Horiz. 3 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,150, Min. 400. Hilly alinement. Road recently improved.

ROUTE 416. JCT. ROUTE 25 - JCT. ROUTE 506

Jct. Route 25 - Fu-ning (161 km.)  
SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 950, Min. 200. Hilly alinement.

Fu-ning - Jct. Route 506 (85 km.)  
SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 68 m. at km. 85. Min. Clearances: Horiz. 4.2 m., Vert. unlimited. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement.

ROUTE 418. JCT. ROUTE 505 - JCT. ROUTE 23

Jct. Route 505 - Lo-p'ing (266 km.)  
SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 2 totaling 208 m., longer 135 m. at km. 232. Min. Clearances: Horiz. 4 m., Vert. unknown. CAPACITY (ST/day): Max. 550, Min. 100. Mountainous alinement.

Lo-p'ing - Jct. Route 23 (161 km.)  
SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 1,350, Min. 450. Hilly alinement.

ROUTE 505. PAI-SE - JCT. ROUTE 418  
(140 km.)

SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 550, Min. 100. Mountainous alinement. Ferry across the Nan-pan Chiang; river reportedly fordable during dry season.

## (S) HIGHWAYS (Continued)

### ROUTE 506. JCT. ROUTE 416 - NAN-NING

Jct. Route 416 - Pai-se (58 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 1 of 68 m. at km. 13. Min. Horiz. Clearance 3 m. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement. Ferry over the Hsi-yang Chiang near Pai-se.

Pai-se - Nan-ning (258 km.)

SURFACE: Type, improved earth; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 3 totaling 252 m., longest 107 m. at km. 218. CAPACITY (ST/day): Max. 700, Min. 150. Hilly alinement.

### ROUTE 507. CHINA/N. VIETNAM BORDER - JCT. ROUTE 506

China/N. Vietnam Border - Ching-hsi (26 km.)

SURFACE: Type, gravel; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 700, Min. 150. Mountainous alinement.

Ching-hsi - Jct. Route 506 (127 km.)

SURFACE: Type, improved earth; Width 3.6-4.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: none. CAPACITY (ST/day): Max. 700, Min. 150. Hilly alinement. Ferry over the Hsi-yang Chiang.

### ROUTE 509. CHINA/N. VIETNAM BORDER - P'ING-HSIANG (61 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 250 m. at Lung-ching. Min. Clearances: Horiz. 9.1 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement.

### ROUTE 510. CHINA/N. VIETNAM BORDER - JCT. ROUTE 27 (58 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-1 m. wide. BRIDGES: 3 totaling 138 m., longest 62 m. at km. 0. Min. Clearances: Horiz. 7 m., Vert. unlimited. CAPACITY (ST/day): Max. 850, Min. 150. Mountainous alinement.

### ROUTE 511. CHIN-HSIEN - JCT. ROUTE 26 (103 km.)

SURFACE: Type, gravel; Width 4.5-5.2 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 1 of 108 m. at km. 31. Min. Clearances: Horiz. 8.5 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,100, Min. 200. Hilly alinement. Probable ferry or ford; water gap approx. 45 m.

### ROUTE 601. LUNG-CH'I - JCT. ROUTE 31 (198 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 14 totaling 836 m., longest 165 m. at km. 35. Min. Clearances: Horiz. 3.5 m., Vert. unlimited. CAPACITY (ST/day): Max. 1,150, Min. 400. Mountainous alinement.

### ROUTE 602. CHIN-CHIANG - YUNG-AN (249 km.)

SURFACE: Type, improved earth; Width 4.5-5.2 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 8 totaling 511 m., longest 151 m. at km. 60. CAPACITY (ST/day): Max. 750, Min. 250. Mountainous alinement.

### ROUTE 603. JCT. ROUTE 27 - P'U-CH'ENG (201 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 6 totaling 494 m., longest 213 m. at km. 149. Min. Clearances: Horiz. 4 m., Vert. unlimited. CAPACITY (ST/day): Max. 955, Min. 200. Mountainous alinement.

### ROUTE 701. WENCHOW - JCT. ROUTE 31 (259 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. fair; Shoulders 0-0.6 m. wide. BRIDGES: 18 totaling 1,668 m., longest 232 m. at km. 234. Min. Horiz. Clearance 4.8 m. CAPACITY (ST/day): Max. 1,300, Min. 250. Hilly alinement.

### ROUTE 702. HANGCHOW - JCT. ROUTE 33 (164 km.)

SURFACE: Type, gravel; Width 5.5-6 m.; Cond. good; Shoulders 0-0.6 m. wide. BRIDGES: 8 totaling 1,647 m., longest 1,400 m. at km. 1. CAPACITY (ST/day): Max. 1,700, Min. 550. Undulating alinement.

## (S) INLAND WATERWAYS

### 1. YANGTZE: MOUTH - LU-CHOU

Mouth - Hankow (1,126 km.)

TYPE, improved stream; CHANNEL WIDTH, 1,203 m.; SAFE DRAFT: 8.8 m. HW (Apr.-Sept.), 3.4 m. LW (Oct.-May). STRUCTURES: rail/highway bridge at Hankow, clearance adequate for normal navigation. CAPACITY (ST/day): 19,000. 4,700-ton river craft can navigate at LW. Use of maritime transport, particularly during HW season, would substantially increase capacity. Night navigation facilities available.

Hankow - Chungking (1,397 km.)

TYPE, improved stream; CHANNEL WIDTH, 58 m. (river width through narrowest gorge); SAFE DRAFT: 3.3 m. HW (Apr.-Sept.), 2.4 m. LW (Oct.-May). STRUCTURES: none. CAPACITY (ST/day): 17,000. Gorge section 3 km. above Hankow has been improved, facilitating day and night passage for powered vessels. Where currents are rapid electric winches tow under-powered craft and sailing junks. Hankow - Chungking round trip time 7 days for modern steamers with barges in tow. Above capability assumes lighterage and riverbank transfer in and near Chungking.

Chungking - Lu-chou (306 km.)

TYPE, improved stream; CHANNEL WIDTH, unknown; SAFE DRAFT: Est. 1.8 m. HW (July-Sept.), navigable by craft of 200 to 300 DWT; 0.9 m. LW (Oct.-June), restricted to craft of 50 DWT. STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): HW 2,500, LW 1,500.

### 2. GRAND CANAL: HANGCHOW - HUAI-YIN

Hangchow - Chen-chiang (314 km.)

TYPE, land-cut canal; CHANNEL WIDTH, unknown; SAFE DRAFT: Est. 2 m., navigable by 100-ton river steamers. STRUCTURES: Bridges spanning waterway do not impede normal navigation. Tidal gates at Chen-chiang, restriction unknown. CAPACITY (ST/day): 4,000. Night navigational facilities available. Water levels are affected to a limited extent by tidal and seasonal fluctuations on adjacent waterways. Alternate access to the Yangtze is available through the Chiang-yin Canal.

Chen-chiang - Huai-yin (175 km.)

TYPE, land-cut canal; CHANNEL WIDTH, max. 44 m., min. unknown; SAFE DRAFT, 3 m. STRUCTURES: Bridges spanning waterway do not impede normal navigation; locks at Yang-chou, Shao-po, and Kao-yu; limiting lock at Kao-yu is 100 m. x 10 m. with 8-m. lift. CAPACITY

### 7. MIN CHIANG: MOUTH - NAN-P'ING (183 km.)

TYPE, improved natural stream; CHANNEL WIDTH, 406 m. (river width at Nan-p'ing); SAFE DRAFT, unknown; small steamers and launches navigate to Nan-p'ing. STRUCTURES: Low bridge at Foochow, vert. clearance 3.6 m.; other bridges do not impede normal navigation. CAPACITY (ST/day): 1,050. Channel bifurcates near Foochow; southern channel bypasses the low bridge. Night navigational facilities available.

### 8. CHU CHIANG/HSI CHIANG-YU CHIANG/ LI CHIANG: KUANG-CHOU - LUNG-CHING

Kuang-chou - Wuchow (422 km.)

TYPE, improved natural stream with tidal influence; CHANNEL WIDTH, 366 m. - 1,414 m. (river width); SAFE DRAFT: 3.9 m. HW (Apr.-Sept.), 1.8 m. LW (Dec.-Mar.) STRUCTURES, none. CAPACITY (ST/day): 12,000. Wuchow is head of navigation for small oceangoing vessels; river craft of up to 1,000 GT are also in use.

Wuchow - Nan-ning (650 km.)

TYPE, improved natural stream; CHANNEL WIDTH: 122 m.-548.6 m. (river width); SAFE DRAFT: 2.3 m. HW (Apr.-Sept.), 1.8 m. LW (Oct.-Mar.) STRUCTURES: Bridges spanning waterway do not impede navigation. Hsi-ching lock and dam 183 x 9 m. with 1.8 m. depth over sill. CAPACITY (ST/day): 10,000. Recently constructed Hsi-ching Lock considered operational. Night navigational facilities available.

Nan-ning - Lung-ching (275 km.)

TYPE, natural stream; CHANNEL WIDTH, unknown; SAFE DRAFT: 1.8 m. HW (Apr.-Sept.), 0.9 m. LW (Dec.-Feb.). STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): HW 1,000, LW 350. Steamers of less than 70 DWT navigate this waterway.

### 9. PEI CHIANG: HSI CHIANG - SHAO-KUAN (269 km.)

TYPE, improved stream; CHANNEL WIDTH, unknown; SAFE DRAFT: est. 1.5 m. HW (May-Sept.), 0.9 m. LW (Oct.-Apr.). STRUCTURES, none. CAPACITY (ST/day): HW 1,000, LW 250. Craft of 50-ton capacity can navigate. Night navigational facilities available.

### 10. KUEI CHIANG/LING CH'U CANAL/HSIANG CHIANG: WUCHOW - LING-LING

ities available.

3. CHIANG-YIN CANAL: YANGTZE TO GRAND CANAL (37 km.)

TYPE, land-cut canal; CHANNEL WIDTH & SAFE DRAFT, unknown. STRUCTURES: Bridges spanning waterway do not impede normal navigation; lock at Chiang-yin is 125 m. x 18 m. CAPACITY (ST/day): 10,800. Route provides alternate access to the Yangtze from the Grand Canal.

4. KAN CHIANG: YANGTZE (P' O-YANG HU) - KAN-CHOU (600 km.)

TYPE, improved stream; CHANNEL WIDTH, unknown; SAFE DRAFT: 2.4 m. HW (May-Aug.) navigable by steamers; 0.6 m. LW (Sept-Apr.) STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): HW 9,000, LW 200. Night navigational facilities available. Available craft from Yangtze System could sustain the capacity indicated.

5. HSIANG CHIANG: YANGTZE (TUNG-T'ING HU) - LING-LING

Tung-t'ing - Hsiang-t'an (148 km.)  
TYPE, improved stream; CHANNEL WIDTH, 183 m.; SAFE DRAFT: 3.6 m. HW (Mar.-Oct.), navigable by craft of 2,000 DWT; 1.5 m. LW (Nov.-Feb.) STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): HW 12,000, LW 6,000. Hsiang-t'an is the head of navigation for large and medium river steamers.

Hsiang-t'an - Ling-ling (512 km.)  
TYPE, natural stream; CHANNEL WIDTH, 244 m. - 914 m. (river width); SAFE DRAFT: 1.2 m. HW (Mar.-Oct.), est. 0.6 m. LW (Nov.-Feb.) STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): HW 1,000, LW 200. Navigable by vessels of 40-100 DWT, depending on water level.

6. WU CHIANG: YANGTZE - SSU-NAN (348 km.)

TYPE, improved stream; CHANNEL WIDTH, 15 m. - 61 m. (river width); SAFE DRAFT: unknown HW (Apr.-Sept.), 0.6 m. LW (Oct.-Mar.) STRUCTURES, none. CAPACITY (ST/day): HW 100, LW 1,000. HW capability based on availability of small fleet of high-powered craft specially designed for use during HW when swift currents preclude operations by other craft. Towage by electric winches, located at rapids, is required for all upstream traffic.

Wuchow - Kuei-lin (306 km.)

TYPE, improved stream; CHANNEL WIDTH, 76 m. (min. river width); SAFE DRAFT: 1.5 m. HW (May-Sept.), 0.9 LW (Oct.-Apr.). STRUCTURES: Chao-ping Dam (under construction). CAPACITY (ST/day): HW 1,000, LW 250. Dam may impede through navigation; information concerning incorporation of a navigation lock or bypass is lacking.

Kuei-lin - Ling-ling (219 km.)

TYPE, natural stream and land-cut canal; CHANNEL WIDTH, est. 4.5 m.; SAFE DRAFT, est. 0.6 m. STRUCTURES: No bridges. 36 primitive locks on Ling Ch'u Canal, dimensions unknown. CAPACITY (ST/day): 150. Ling Ch'u Canal limits navigation to 6-ton craft.

11. HSI CHIANG/LIU CHIANG/JUNG CHIANG WATERWAY: KUEI-P'ING - LIU-CHOU (259 km.)

TYPE, natural stream; CHANNEL WIDTH, 700 m. - 914 m. (river width at Liu-chou); SAFE DRAFT: 2.4 m. HW (Oct.-Mar.), 1.8 m. LW (Apr.-Sept.) STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): 6,000. Used by craft of 70- to 100-ton capacities.

12. HSI-YANG CHIANG: LI CHIANG - PAI-SE (309 km.)

TYPE, improved natural stream; CHANNEL WIDTH, unknown; SAFE DRAFT: unknown HW (Apr.-Sept.), 1.2 m. LW (Oct.-Mar.). STRUCTURES, none. CAPACITY (ST/day): 1,500. Steamers utilized on route. Terminal facilities available at Pai-se.

13. RED RIVER: YUAN-CHIANG - LAO CAI, NORTH VIETNAM (288 km.)

TYPE, natural stream; CHANNEL WIDTH, unknown; SAFE DRAFT: est. 1.1 m. HW (June-Oct.), 0.8 m. LW (Nov.-May). STRUCTURES: Bridges spanning waterway do not impede normal navigation. CAPACITY (ST/day): HW 250, LW 50. Navigation by 20 DWT craft reported; a 50-ft. shallow-draft tug also reported to be operating on lower section of this route.

14. MEKONG: CH'E-LI - BURMA BORDER (61 km.)

TYPE, improved stream; CHANNEL WIDTH, unknown, numerous gorges; SAFE DRAFT: est. 1.2 m. MW (May-June & Nov.-Dec.); est. 0.6 m. LW (Jan.-Apr.). HW conditions (July-Oct.) preclude navigation. STRUCTURES: Bridge at Yun-ching-hung does not impede navigation. CAPACITY (ST/day): Downstream MW 150, LW 50. No significant upstream capacity due to limited number of powered craft available. Some sections have been blasted and dredged.

## (C) BEACHES

### 1. FORT BAYARD

LENGTH : 550 m.  
BOTTOM SLOPE : 1 on 25 to 1 on 65 shoreward of 5.5 m. curve 125 to 370 m. off LW line;  
9.1 m. curve 150 to 420 m. off LW line.  
APPROACH : Offshore approach restricted to narrow shipping channels leading to Fort  
Bayard; nearshore approach clear but flanked by pier to S. and wharf to N.;  
protected anchorage in channel off beach.  
SURF AND TIDE: Surf 1.2 m. or higher occurs infrequently; tidal range 2.7 m., springs.  
MATERIAL : Sand, intermixed with mud below HW line; trafficability poor to fair.  
TERRAIN : Beach immediately backed by low embankment fronting park extending about  
70 m. inland to streets of Fort Bayard; park covered with grass and scat-  
tered trees.  
EXIT : Cross country and by several scattered tracks to all-weather streets of  
Fort Bayard; all-weather road leads N. from Fort Bayard and extends 47 km.  
to highway Route 27; rail Line 10 leads NNW. from Fort Bayard.  
CAPACITY : 250 ST/day.

(9) BEACHES (Continued)

2. CENTERED 36.5 KM. NE. OF FORT BAYARD

LENGTH : 10.2 km.; interrupted by stream near center.  
BOTTOM SLOPE : 1 on 800 to 1 on 935 shoreward of 11 m. curve 10.9 to 12.7 km. off LW line; area poorly charted.  
APPROACH : Offshore approach clear; nearshore approach probably clear except for rocky shoal with least depth of 1.8 m. 1.3 km. off NE. end of beach, and possible fishing stakes along beach; partly protected anchorage available.  
SURF AND TIDE: Surf 1.2 m. or higher estimated to occur infrequently during Oct. through Mar., 23% of the time June through Aug., and 10% during remaining months; tidal range 2.6 m., springs.  
MATERIAL : Sand, with mud and silt below HW line; trafficability poor to fair.  
TERRAIN : Flat to undulating plain extends to large river 3 to 6 km. inland; beach immediately backed by dune belt 225 to 600 m. wide - dunes are up to 20 m. high and mostly covered by forest. A narrow strip of old beach ridges and wetland rice backs the dune belt; behind the strip extensive ricefields interspersed with some dryland cultivation extend to the river which is fronted by scattered rolling hills. Town situated 5.5 km. N. of NE. end of beach.  
EXIT : Cross country (trafficability poor) or by few tracks across dunes to sparse network of tracks leading to all-weather coastal road 2 to 2.5 km. behind central and NE. parts of the beach; road leads SW. to Fort Bayard.  
CAPACITY : 14,000 ST/day.

3. CENTERED 89 KM. SE. OF LU-FENG

LENGTH : 4.8 km.  
BOTTOM SLOPE : 1 on 80 to 1 on 170 shoreward of 5.5 m. curve 455 to 910 m. off LW line; 11 m. curve 3 km. off LW line.  
APPROACH : Offshore approach partly obstructed by islands, islets, and rocks 6.4 to 9.6 km. off LW line; nearshore approach clear; unprotected anchorage available.  
SURF AND TIDE: Surf 1.2 m. or higher estimated to occur 10% of the time during June through Aug. and infrequently in other months; tidal range 1.1 m., springs.  
MATERIAL : Sand; trafficability fair.  
TERRAIN : Mostly level lowland dotted by isolated hills and scattered villages extends to hills and mountains 2.4 to 4 km. inland; lowland predominantly covered with wetland rice; hills and mountains covered with grass and bush.  
EXIT : Trails from NW. part of beach and cross country (trafficability poor) to surfaced road 2 to 4 km. inland; surfaced road joins highway Route 27 30 km. N. of beach.  
CAPACITY : 2,800 ST/day.

4. CENTERED 85 KM. SE. OF LU-FENG

LENGTH : 6 km.  
BOTTOM SLOPE : 1 on 150 to 1 on 200 shoreward of 9.1 m. curve 1.4 to 1.8 km. off LW line.  
APPROACH : Offshore approach partly obstructed by shoal and rocks 2.3 to 2.7 km. off LW line; nearshore approach partly obstructed by rocks, islets, and shoal 640 m. to 1.4 km. off LW line; unprotected anchorage available.  
SURF AND TIDE: Surf 1.2 m. or higher estimated to occur 4% of the time Oct. through Mar., 7% June through Aug., and infrequently during remaining months; tidal range 1.1 m., springs.  
MATERIAL : Sand; trafficability fair.  
TERRAIN : Mostly level lowland extends to hills and mountains 1 to 5 km. inland; lowland contains partly reclaimed land, a lagoon, scattered villages, and a low dune belt 275 m. wide immediately behind the beach; the dunes are interrupted by personnel trenches and a probable drainage ditch.  
EXIT : Surfaced road winds from NE. part of beach to highway Route 27, 26 km. N. of beach.  
CAPACITY : 3,000 ST/day.

5. CENTERED 56 KM. W. OF LU-FENG

LENGTH : 12.2 km.  
BOTTOM SLOPE : 1 on 360 to 1 on 735 shoreward of 5.5 curve 3 to 5 km. off LW line; 11 m. curve 7 to 10 km. off LW line.  
APPROACH : Offshore approach partly obstructed by shoal and rocks 14 to 24 km. off beach; nearshore approach partly obstructed by island, rocks, and shoal 1 to 8.5 km. off LW line; partly protected anchorage available.  
SURF AND TIDE: Surf 1.2 m. or higher estimated to occur 11% of the time June through Aug. and infrequently during remaining months; tidal range 0.9 m., springs.  
MATERIAL : Sand; trafficability fair.  
TERRAIN : Partly marshy lowland extends to hills and mountains 90 m. to 2 km. inland; lowland is cut by many streams and rivers; beach immediately backed by sandy strip 30 to 275 m. wide covered by grass and scrub; remainder of lowland has scattered villages and is largely devoted to wetland rice; hills and mountains are mostly covered by grass and scrub.  
EXIT : Several trails from beach lead to highway Route 27, 45 m. to 2.8 km. inland.  
CAPACITY : 3,000 ST/day.

6. CENTERED 54 KM. SW. OF AMOY

LENGTH : 4.3 km.  
BOTTOM SLOPE : 1 on 100 shoreward of 5.5 m. curve 545 m. off LW line; 11 m. curve 2.5 km. off LW line.  
APPROACH : Offshore approach clear; nearshore approach partly obstructed by rocks 910 m. to 1.4 km. off SW. end of beach; unprotected anchorage available.  
SURF AND TIDE: Surf 1.2 m. estimated to occur 14% of the time June through Aug. and infrequently during remaining months; tidal range 4 m., springs.  
MATERIAL : Sand; trafficability fair.  
TERRAIN : Level to undulating lowland is hemmed in by hills and mountains 6 km. behind NE. end of beach and by a bay 4.5 km. behind SW. end; wetland rice predominates on the lowland, which is dotted by isolated hills and contains numerous watercourses, marshy areas, and scattered towns and villages; the beach is immediately backed by a belt of low dunes extending 300 m. to 1 km. inland.  
EXIT : Cross country (trafficability poor) to surfaced road 1.3 to 2 km. behind center and SW. parts of beach; road winds across lowland to highway Route 27, 25 km. W. of beach.  
CAPACITY : 5,000 ST/day.

7. CENTERED 30 KM. S. OF CH'UAN-CHOU

LENGTH : 4 km.  
BOTTOM SLOPE : 1 on 75 to 1 on 335 shoreward of 5.5 m. curve 435 m. to 1.8 km. off LW line; 11 m. curve 5 km. off LW line.  
APPROACH : Offshore approach clear; nearshore approach restricted to channels between islets and rocks; unprotected anchorage available.  
SURF AND TIDE: Surf 1.2 m. or higher estimated to occur 6% of the time during Oct. through Mar., 5% during June through Aug., and infrequently during other months; tidal range 5.5 m., springs.  
MATERIAL : Sand, with some mud and silt on foreshore; trafficability poor to fair.  
TERRAIN : Beach on 8.5 km.-wide peninsula; lowland dotted by isolated hills and lakes and dissected by numerous streams extends across peninsula; lowland is intensively cultivated in wetland rice and contains numerous towns and villages; low, nearly barren dunes immediately back beach and extend 90 to 555 m. inland.  
EXIT : Few tracks, trails, and an unsurfaced road lead to surfaced road 900 m. to 2.3 km. behind beach; surfaced road joins highway Route 27, 15 km. N. of beach.  
CAPACITY : 6,000 ST/day.

8. CENTERED 49.5 KM. S. OF SHANGHAI

LENGTH : 4.4 km.  
BOTTOM SLOPE : 1 on 20 to 1 on 80 shoreward of 5.5 curve 455 m. to 1.1 km. off LW line; 9.1 m. curve 14.6 to 15.6 km. off LW line.  
APPROACH : Offshore approach restricted to Hangchow Bay and partly obstructed by islands and islets 24 km. and farther off beach; nearshore approach partly obstructed by detached breakwater off W. end of beach; partly protected anchorage available.  
SURF AND TIDE: Surf 1.2 m. or higher estimated to occur 7% of the time during June through Aug. and infrequently during remaining months; tidal range 6.7 m., springs.  
MATERIAL : Sand and gravel; trafficability fair.  
TERRAIN : E. part of beach backed by saltpans and wetland ricefields extending 90 to 320 m. inland; ricefields, saltpans, and remainder of beach backed by levee estimated 4.5 m. high.  
EXIT : Cross country (trafficability poor) to highway Route 31 on levee.  
CAPACITY : 4,000 ST/day.

# (5) AIRFIELDS

Name/Coordinates	Runway Surface/ Dimensions	Aircraft (type)	Daily Sorties (no.)	Capacity (ST/day)	POL Storage Capacity		
	(meters)				Fuel* (1,000 gal.)	Oil	Lube
Canton/White Cloud 23°11'N., 113°16'E.	Concrete 3,476 x 67	C-141	168	7,812	5,000	A	A
Ch'ang-sha/Ta-t'ao 28°04'N., 112°57'E.	Concrete 2,012 x 61	C-141	240	11,160	1,600	A	A
Chang-shu 28°02'N., 115°31'E.	Concrete 3,780 x 82	C-141	104	4,836	1,000	A	A
Ch'eng-tu/Wen-chiang 30°42'N., 103°54'E.	Concrete 2,439 x 70	C-141	64	3,976	600	A	A
Fu-chou/Nan-ta'i 26°00'N., 119°19'E.	Concrete 2,012 x 61	C-141	96	4,464	600	A	A
Hangchow 30°20'N., 120°14'E.	Concrete 2,195 x 61	C-141	211	9,812	600	A	A
Hung-ch'iao (Shanghai) 31°12'N., 121°20'E.	Concrete 3,161 x 70	C-141	240	11,160	600	A	A
Ku'n-ming 25°00'N., 102°44'E.	Concrete 2,988 x 64	C-141	112	5,208	600	A	A
Lei-yang 26°45'N., 117°39'E.	Concrete 2,652 x 64	C-141	120	5,580	2,656	A	A
Lung-ch'i 24°34'N., 117°39'E.	Concrete 2,378 x 64	C-141	96	4,464	900	A	A
Meng-tzu West 23°24'N., 103°20'E.	Concrete 2,561 x 64	C-141	88	4,092	1,000	A	A
Nanking/Ta-chaio-chang 32°00'N., 118°49'E.	Concrete 2,195 x 61	C-141	176	8,184	300	A	A
Ning-ming 22°07'N., 107°08'E.	Concrete 2,317 x 46	C-141	72	3,348	300	A	A
Pang-fou 32°56'N., 117°22'E.	Concrete 1,982 x 61	C-141	120	5,580	300	A	A
Shan-p'ao 30°05'N., 114°19'E.	Concrete 2,378 x 48	C-141	64	2,976	300	A	A
Sui-ch'i 21°24'N., 110°12'E.	Concrete 1,951 x 97	C-141	80	3,720	500	A	A

POL Storage Capacity Code:

\* - All types.

A - Available, quantities unknown.