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NATIONAL INTELLIGENCE SURVEY

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Transportation and
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This chapter was prepared for the NIS by the Defense Intelligence Agency. It includes a contribution on airfields from the Defense Mapping Agency, Aerospace Center, and a contribution on merchant marine from the Department of the Navy. Research was substantially completed by October 1972.

GUATEMALA

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The Pan American Highway winding through Guatemala (U/OU)

Transportation and Telecommunications

A. Appraisal (C)

All significant transportation and telecommunication (telecom) facilities of Guatemala are located in the southern half of the country, the highland and coastal plain area where almost all of the populace resides and essentially all economic activity takes place (Figure 10). Agriculture is the backbone of the economy, and basically the surface transportation systems have been built to serve it and the needs of the government. The vast tropical forests of the north are virtually uninhabited and have almost no manmade transportation facilities; communication there is by radio. Even in the south the systems are quite limited, but they generally suffice to meet the needs of the country. International connections by rail and road are made with Mexico and El Salvador and by road or track with Honduras and British Honduras. Most networks and facilities are densest and best in the immediate vicinity of the capital, Guatemala City, declining very rapidly a short distance from the capital and leaving many parts of the hinterland without service.

Railroads are the most important medium and, by Latin American standards, most are good. They serve the important south, linking the Pacific and Caribbean coasts and most of the ports with the capital and largest cities. The rail network comprises two systems, the government-owned Railroads of Guatemala and the United Fruit Company rail system. The government has built and improved highways paralleling most of the system, and the growing competition of trucks and buses has reduced the relative importance of the railroads. The highway system, generally inferior and second to rail in importance, also links the highland region with the two coasts. Inland waterways, used mainly for local traffic, are of only slight importance as a transportation mode.

Two crude-oil pipelines serve petroleum refineries at Escuintla, near the southern coast, and Santo Tomas de Castilla¹ on the northern coast. The southern line is

¹For diacritics on place names see the list of names on the apron of the Terrain and Transportation Map, the map itself, and map in the text.

the longer; it is of 6-inch pipe and extends 25 miles from San Jose to the 14,000-barrels-per-day Texaco refinery at Escuintla. In the north a 2.8-mile-long 14-inch-diameter pipeline connects the 11,000-barrels-per-day Guatemala-California petroleum refinery with the port facilities at Santo Tomas de Castilla.

The Caribbean coast, on which are located both major ports, supports most maritime activity, chiefly with the United States and Europe, to which agricultural products are exported and from which needed manufactures come. The nature of the terrain of Guatemala gives civil air importance in some areas even though only four of the 310 airfields have paved runways and most of the others accommodate only light transports at best. Telecommunications are poor and inadequate except in Guatemala City, where facilities are fairly modern. The most important communication services are the open-wire telegraph and telephone systems, which are supplemented by radio. The government owns and operates two ports, the scheduled airline, some communication facilities, and is the major owner of the small merchant marine; the remaining facilities and systems are privately owned and operated.

B. Strategic mobility (C)

The transportation and telecommunication facilities of Guatemala could support small-scale military operations in the populated southern part of the country, but in the north the facilities would be totally inadequate. The principal rail line is located in the south and connects Pacific Ocean and Caribbean Sea maritime facilities. Railroads are the main means for logistic movement from the coasts to the frontier and provide international connections with Mexico and El Salvador. Highways serve many areas where there is no rail but could be used only sparingly in troop movement and supply operations because of their poor quality and scarcity of alternate routes. Most roads, including main highways, were originally constructed to low standards intended for light traffic

and would require a considerable amount of maintenance if subjected to heavy military traffic. Interdiction of any of the few major bridges on the highways would necessitate circuitous rerouting. Roads in mountainous areas are especially vulnerable.

Inland-waterway facilities are too limited to be of appreciable military value, but all the seaports are adaptable to military use. Guatemala does not have sufficient experienced indigenous personnel to man its merchant fleet consisting of two 1,815-g.r.t. dry-cargo units.

The airfield system could provide limited support to military operations. Only four of the 476 airfields have hard-surfaced runways. La Aurora, the best airfield, can support sustained operations of aircraft up to and including the C-135. Resources of the Guatemalan Aviation Enterprise (AVIATECA), the government-owned airline, could be easily mobilized in an emergency, many of the flight-crew members are Guatemalan Air Force officers. However, the carrier's flight equipment could not be operated for sustained periods because of the limited availability of spare parts and the airline's minimal maintenance facilities.

Telecom facilities in Guatemala City are modern and could support logistic operations; however, facilities elsewhere are limited and in poor condition. Telecom facilities are poorly protected, and sabotage of vital installations in the capital would completely disrupt national and international communications. Open-wire routes are ideal targets and already have been the object of successful terrorist activity.

C. Railroads (C)

The Guatemalan rail network has 592 route miles of 3'0" narrow-gage single-track nonelectrified lines. In general the railroads are adequate in both extent and condition to meet the present level of economic needs and carry 60% of the national commercial transport. The network is strategically located in the southern populated portion of the country and supports both national and regional transportation growth. In the developing Central American Common Market, Guatemala plays an important role as the only country with existing coast-to-coast rail connections. Additionally, the transisthmian movement serves as a possible alternative to the Panama Canal.

The railroads, the most important mode of transportation, are the main means of movement from the coasts into the interior. The area served contains about 99% of the population and most of the productive areas, among which are the coffee-growing regions of the interior central highlands and the

banana-growing plantations along the coastal plains. Much of this area is mountainous, and steep grades and sharp curves severely limit train operations. On the western slope of the continental divide, sustained grades from 3% to 3.7% and numerous consecutive severe curves exist for about 17 miles.

Two international rail connections are made, one at Anguatu with the 3'0"-gage line of the International Railroad of Central America (IICA), El Salvador, and the other with the standard-gage (4'8 1/2") National Railroads of Mexico at Ciudad Tecun Uman where there are transloading facilities to handle both freight and passenger traffic.

The rail network is composed of two systems: the government-owned 520-mile Railroads of Guatemala (*Ferrocarriles de Guatemala*—FEGUA), formerly the privately owned single-track lines of the International Railroads of Central America, Guatemala Division (IRCA-GD), and the 72-mile line owned by the U.S. United Fruit Company (UFC). FEGUA is the more important and handles both freight and passengers. The main line extends from Puerto Barrios and Santo Tomas de Castilla on the Caribbean Sea across the country to Guatemala City and on to the Mexican border. A major branch line runs between Zacapa and the El Salvador border; several shorter branch lines connect Pacific ports with the main line. FEGUA is under the Ministry of Communications and Public Works. The UFC consists of several banana-plantation lines on the Caribbean coastal plain in the Bananera-Chickasaw-Quirigua area.

FEGUA employs about 3,500 people, all of whom belong to the Union for Railroad Workers' Action and Betterment (SAMF); UFC employs about 200 people. Both railroads are overstaffed. The general level of worker competence is adequate. On-the-job training is provided, but there are no formal training schools.

Important FEGUA yards, all flat type, are located at Guatemala City, Puerto Barrios, Zacapa, Escuintla, and Ciudad Tecun Uman. The major UFC yard, at Bananera, is also flat. All yards have adequate capacities to handle present traffic demands. However, the yards are hampered in redesign and rebuilding because they are surrounded by built-up areas. They cannot accommodate the longer trains associated with diesel operations nor can they meet changing classification demands.

It is estimated that the 570 bridges on the FEGUA have an aggregate length of 34,850 feet. Many are of steel-through-truss construction. The 14 tunnels have a total length of 4,391 feet, are partially or completely masonry lined, and are not ventilated. All the structures are single track, and the bridges can handle

existing equipment loaded to capacity. UFC lines have four steel-truss bridges and a small number of steel I-beam structures.

FEGUA train movements are by timetable and written train orders, and trains are dispatched by a central dispatching system. A few of the larger stations have semaphore signals; all others use hand signals. All switches and fixed signals are manually operated. Telephone and telegraph are the primary means of communication between the central dispatchers (at Guatemala City and Zacapa) and all stations. Each train crew carries a portable telephone for use at intermediate points. UFC train movements are by train orders. All switches are set manually, and only hand signals are used. The chief means of communication is telephone.

FEGUA and UFC utilize both steam and diesel power. Rail equipment, which is generally old (Figure 1), is adequate in amount and capacity to meet all demands and ranges in condition from poor to good. Most of the equipment is maintained by a native labor force under the supervision of a cadre of U.S.-trained native foremen. Box, flat, and banana cars, the predominate types of freight rolling stock, are of wood construction and have four axles. FEGUA equipment is interchanged with the IRCA in El Salvador.

In 1969 the equipment inventory was as follows:

	FEGUA	UFC
Locomotives:		
Steam	134	9
Diesel electric	42	10
Freight cars	2,767	36
Passenger cars	155	33

Most equipment has been imported from the United States. In 1969 UFC received two new diesel locomotives from General Electric, and in 1971 FEGUA received 18 diesel-electric locomotives from Babcock and Wilcox of Spain.

Major repair facilities are located in Guatemala City (Central Station) for the FEGUA and at Bananera for the UFC. Puerto Barrios, Zacapa, and Ciudad Tecun Uman have smaller FEGUA repair facilities. The repair shops are adequate for current needs. Spare parts are nearly unobtainable and frequently must be fabricated in the local shops, thereby causing considerable locomotive downtime awaiting and undergoing repairs. All locomotives burn fuel oil or diesel oil, most of which is imported from the United States.

Construction and maintenance work is adequate but is hampered by the lack of modern equipment, workman expertise, and sufficient funds. A FEGUA branch line to Tiquisate was dismantled in 1969, and

the material was used to build a 4.5-mile branch to Santo Tomas de Castilla.

FEGUA has trouble meeting expenses and traditionally operates at a loss with no prospect for change. Development plans are limited and include consideration of a reorganization program and new equipment purchases. Information is not available on UFC development plans.

In 1969 FEGUA handled 622,600 short tons of freight and about 1.5 million passengers. The principal freight commodities are agricultural products—primarily bananas and coffee—and construction materials. There has been a downward trend in FEGUA freight and passenger traffic caused principally by increasing competition from highway transportation and by the generally low level of economic activity of the country. Traffic statistics are not available for UFC; its principal freight is bananas.

The most serious construction and maintenance problems stem from adverse terrain and weather. Lines in mountainous terrain are subject to landslides and rockslides, and flood damage to track during the rainy season (May through October) is often serious. Interruptions, sometimes of two weeks duration, commonly occur between Puerto Barrios and Guatemala City, here in several places the line parallels rivers and in other places lies along steep mountain slopes.

FEGUA track structure is light. All rail is of the T-section type and is imported, primarily from the United States, the United Kingdom, and West Germany. Rail weights range from 54 to 75 pounds per yard, 60- and 70-pound weights predominating, and rail lengths vary from 30 to 39 feet. Tie plates and cut spikes are used, and rails are joined by angle bars. Most ties are of untreated native hardwood; the remainder are of creosoted pine imported from the United States. Ties are spaced 2,600 to 2,980 per mile. Ballast is of river gravel on 80% of the route mileage and of volcanic sand and crushed stone on the remaining 20%. Maximum axle-load limits are 18.5 short tons. The maximum grade of 3.7% occurs in the mountainous area west of Guatemala City, and the minimum radius of curvature, 302 feet, is between Puerto Barrios and Guatemala City. Passing tracks are short, built to accommodate steam-powered trains, but many passing tracks are being lengthened to hold longer diesel-powered trains.

Rails for the UFC, imported from the United States, weigh from 40 to 60 pounds per yard; 40-pound rail predominates. Rails are 30 feet long. All ties are treated wood and are imported from the United States. Ballast is crushed stone and sand. Adequate



FIGURE 1. Zacapa roundhouse and turntable.
All engines in picture are in service. (U/OU)

local supplies exist. Maximum axleload limits are 11 short tons. The maximum grade is 1.1%, and the minimum radius of curvature is 478 feet.

Figure 2 lists characteristics for the major FEGUA routes.

D. Highways (C)

The highways of Guatemala are of major importance to the nation's economy, despite their uneven distribution and generally poor construction and state of maintenance. They link urban and rural areas and interconnect important commercial centers with ports and international frontiers. The overall system, however, is inadequate; large areas of the country are virtually roadless, and major segments of existing highways are incapable of supporting heavy traffic.

The basic highway pattern comprises three major routes, two of them extending between the Mexico and El Salvador borders and one between the Caribbean and Pacific coasts. One of the former, the Inter-American Highway (part of the Pan American Highway system), extends through the highlands and

passes through Guatemala City; the second, the Pacific or Pacific Slope Highway, serves the fertile southern lowlands and passes just north of Retalhuleu and through Escuintla. The Intercoastal Highway, sometimes called the Interoceanic, crosses these two routes and links the Pacific and the Caribbean ports; that portion between Guatemala City and Puerto Barrios is known as the Atlantic Highway. Additional highways serve the Pacific port of Champerico and the international frontiers. Virtually all the highways are situated in the southern half of the country. Except for some poor-quality highways, the northern section is nearly roadless. The only access into this section is via a gravel-surfaced road that connects with the Atlantic Highway near Morales and passes through Modesto Mendez. Highways provide international connections with all four adjoining countries. There are three connections with Mexico and four with El Salvador, and a road from the Atlantic Highway connects with southwestern Honduras. A gravel and earth road connects with British Honduras at Melchor de Mencos.

Guatemala's road density of 0.18 mile per square mile of area compares favorably with most of its

FIGURE 2. Selected characteristics of the railroads of Guatemala (FEGUA) (C)

TERMINALS AND MILEPOSTS	MAXIMUM GRADE		MINIMUM RADIUS OF CURVATURE	MAXIMUM AXLELOAD	PASSING TRACK		REMARKS
	Going	Coming			Maximum Interval	Minimum Length	
	----- Percent -----				Miles	Feet	
Puerto Barrios - Ciudad Tecun Uman (374.15 route miles).	3.3	3.0	302	18.5	6.5	38	At MP 2.22 a 4.5-mile branch line runs to Santo Tomas de Castilla. At Zacapa (MP 103.1) a branch line runs to the El Salvador border. International rail connection and transloading facility at Ciudad Tecun Uman with the National Railroads of Mexico 4'8 1/2"-gauge single-track line. Border is 0.1 mile beyond rail facility. International rail connection at Anguiatu with the International Railroad of Central America, El Salvador 3'0"-gauge single-track line. Border is 0.39 mile beyond rail facility.
Puerto Barrios - Guatemala City (Central Station) (198.00 route miles).	2.2	3.7	333do....	5.0	38	
Guatemala City (Central Station) Ciudad Tecun Uman (176.15 route miles).	2.8	2.2	320do....	6.5	114	
Zacapa - Anguiatu (70.11 route miles)....							

CU

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neighbors. Mexico has 0.06:1, British Honduras has 0.15:1, and Honduras has 0.07:1. Only El Salvador, with 0.65:1, has a greater density.

Guatemala has about 7,600 miles of highways, classified administratively as National and Departmental. About 1,300 miles are bituminous treated or bituminous surfaced, 4,200 miles are gravel or crushed stone, 900 miles are improved earth, and about 1,200 miles are unimproved earth. In addition, there are about 1,000 to 1,500 miles of private roads, some of which are motorable track. The overall condition of the network varies from good to poor. Most of the major highways are surfaced, but even the new highways are permitted to deteriorate excessively before being repaired, and many of the gravel roads are in very poor condition.

The bituminous-surfaced highways ordinarily range from 20 to 22 feet in width, and those of recent construction vary from 22 to 24 feet. The unpaved roads are generally 12 to 20 feet wide. The bituminous-surfaced roads usually have a crushed-stone-and-sand base. Shoulder widths in general vary from 1 to 6 feet, but some are as wide as 12 feet. Many sharp curves and steep grades are found in the mountainous sections, especially on secondary routes. Some newer construction has maximum grades of up to 8% and minimum curve radii of 286 feet.

Most of the 770 highway bridges are of steel construction and have widths ample for two lanes of traffic. Newly constructed bridges on major routes have a designed gross loading of at least 27 tons. The newest are of reinforced-concrete, steel-truss, and steel-beam design and have roadway widths of 25 to 26 feet and overhead clearances of 14.5 to 15.3 feet. However, many low-capacity bridges remain. One of the two known tunnels on the highway network is located 18 miles northeast of Retalhuleu and is 1,053 feet long; the second tunnel is located 6 miles southeast of San Marcos and is 41 feet long. There are many fords, probably with natural bottoms, on secondary roads. One of the two significant ferries crosses the Rio Dulce on the road between Morales and Modesto Mendez (Figure 3), and the other is across the Rio de la Pasion at Sayaxche.

The Directorate General of Highways, under the Ministry of Communications and Public Works, is responsible for highway construction, maintenance, and improvement, and for development of national highway policy. In practice, other ministries and even the President enter into the formation of national highway policies. Within the directorate is the National Highway Bureau, which is divided into eight maintenance and improvement zones. The chief of

each zone is responsible to the Chief of Maintenance of the National Highway Bureau, who in turn is responsible to the Director General of Highways. The highway system of Peten, the large northern department, is independent of the Directorate General of Highways and is under the Agency for the Promotion and Development of Peten (FYDEP). To insure adequate and uniform maintenance of the Inter-American Highway, a Maintenance Authority has been proposed to assume responsibility for maintenance of the highway in the five Central American Republics and Panama.

Overall maintenance is unsatisfactory because of poor administration, lack of engineering and planning skill, low morale of employees, insufficient funds, diversion of maintenance funds to construction, and shortage of equipment and spare parts. Parts deficiency frequently immobilizes equipment and operators from 10% to 50% of the available operating time. Additional problems stem from poor original construction standards, the effects of heavy rains, and the nature of the largely mountainous terrain. Domestic supplies of cement, timber, and aggregate are plentiful, but bitumen, steel, and equipment, particularly mechanized equipment, must be imported.

In the past decade, maintenance of the highway system has fallen behind road construction activities and has resulted in deterioration of much of the network. To rectify this situation, the government plans to emphasize improvement of existing roads and



FIGURE 3. Ferry across Rio Dulce on route between the Atlantic Highway near Morales and Modesto Mendez (U/OU)



FIGURE 4. Gravel-surfaced road between Atlantic Highway near El Rancho and Coban (U/OU)

development of an adequate maintenance program under the development plan for 1971-75. In addition, the program of constructing and improving local access roads is to be continued, and there are plans to construct additional roads connecting the northern and southern regions. Some important highways recently constructed or improved include the Inter-American Highway, which is now completely paved within Guatemala. Much of the older pavement has been improved and widened, and additional work is planned. Paved roads have been extended to Honduras and El Salvador. The road from El Rancho to Coban has been improved. The first 40 miles has a bituminous surface, and the remainder is surfaced with gravel (Figure 4). This road will probably be further improved and extended to the north. The recently constructed gravel-surfaced road connecting the Atlantic Highway, near Morales, with Modesto Mendez affords access to the north. Improvement of the sparse network of gravel and earth roads in the north is in progress, including replacement of fords and temporary bridges with permanent bridges.

Among the bottlenecks and hindrances to traffic are fords, two tunnels, steep grades, sharp curves, short sight distances, excessive dust in the dry season, slides and rockfalls (especially in the rainy season) that may block even main routes for days at a time, and floods that sometimes wash out bridges and sections of road. Other impediments are low-capacity and narrow bridges, narrow streets in towns, and narrow roads in the mountains and jungle areas, all intensified by a general lack of alternative routes.

Establishment and expansion of highway trucking operations are controlled by Interurban Transportation, which is under the Directorate General of the National Police. Most carriers are privately owned enterprises. Some firms carry passengers exclusively, but most carry both passengers and freight. Guatemala City is the center of activity, but the other important cities and ports are also served. In addition, dry and refrigerated tractor-trailer units operate to countries southeast of Guatemala, and a regular through service operates to the U.S. border. There is also ocean service between Santo Tomas de Castilla and Miami, Florida.

Agricultural products are the major commodity moved over the highways, especially truck-farm products brought in daily to urban areas. Trucked exports include cotton, coffee, chicle, meats, sugar, and essential oils. Trucked inland from the ports are machinery, iron and steel products, and chemicals. Other common truck cargoes are minerals and forestry products, beverages and processed foods, shoes and leather products, soap, clothing, furniture, and cement.

Guatemala has about 73,150 motor vehicles (42,800 passenger cars and 30,350 trucks and buses). All automotive vehicles, parts, and accessories are imported, mostly from the United States and Western European countries.

Characteristics of selected highways are listed in Figure 5.

FIGURE 5. Selected highways (C)

ORIGIN AND DESTINATION	DISTANCE	SURFACE TYPE	SURFACE		REMARKS
			WIDTH	SHOULDER WIDTH	
	<i>Miles</i>		<i>Feet</i>	<i>Feet</i>	
Mexico border to El Salvador border via Guatemala City.	313	Bituminous.....	20 to 21	4 to 5.....	Inter-American Highway. Mostly hilly to mountainous terrain. Subject to landslides NW of Huehuetenango.
Mexico border to El Salvador border via Mazatenango and Escuintla.	213	...do.....	20 to 24	4 to 18, mostly 6.....	Pacific Slope Highway. Mostly hilly to mountainous terrain.
San Jose to Puerto Barrios via Escuintla, Guatemala City, and Rio Hondo.	251				Intercoastal Highway.
Mile 0 to 68 (Guatemala City).....	68	...do.....	19 to 24	4 to 19.....	Mostly flat terrain San Jose—Escuintla; hilly to mountainous Escuintla—Guatemala City.
Mile 68 to 251.....	183	...do.....	24	6.....	Mostly hilly to mountainous terrain. Subject to landslides in wet season.
Champerico to Jct. with Pacific Slope Highway near Retalhuleu.	27	...do.....	21 to 23	3 to 11, mostly 6.....	Mostly flat terrain.
Jct. with Intercoastal Highway near Morales to British Honduras border at Melchor de Mencos via Modesto Mendez, Poptun, and Flores.	200	Crushed stone, gravel, earth.	10 to 25	...na.....	Mostly undulating to hilly terrain. Widening of 1-lane segments and improvement of surface underway as is replacement of several fords and temporary bridges with permanent bridges. No short-range plans to replace ferry at Rio Dulce.

na Data not available.

E. Inland waterways (C)

Guatemala has about 600 miles of inland waterways. They do not play a significant role in transportation but in some areas are important to local commerce. Navigation is generally limited to shallow-draft native craft transporting small amounts of cargo and a few passengers; native dugouts (*cayucos*) and outboards may carry several tons of cargo. Cargo is moved on small powered craft and barges operated by the United Fruit Co. The waterways serve as minor transport routes for coffee, bananas, chicle, cattle, minerals, and mahogany and other timber, but there are no significant port facilities. Details on principal inland waterways are listed in Figure 6.

The Guatemalan mountain system divides the country into a Pacific watershed and a Caribbean (Gulf of Honduras) watershed. Rivers flowing into the Pacific Ocean are short and swift and are characterized by hindrances to navigation such as rapids and waterfalls. Rivers emptying into the Caribbean are long; in their headwaters they flow through gorges of deep valleys, but in their lower courses, especially in northern Guatemala, they are wide, sluggish, and winding. Gradients are gentle, and in the lower reaches the streams are navigable by small craft. The plateau of Peten in northern Guatemala is drained into the Gulf of Honduras by the east-flowing Rio Sarstun (which forms the 37-mile southern boundary of British Honduras) and by rivers emptying

into the northwest-flowing Rio Usumacinta and thence into the Gulf of Mexico.

The most important rivers draining into the Gulf of Honduras are the Rio Sarstun, the Rio Polochic (draining into the swampy Lago de Izabal and then the Bahia de Amatique), and the Rio Motagua.

F. Ports (C)

Guatemala has only 250 miles of coastline, 165 miles on the Pacific Ocean and 85 miles on the Caribbean Sea, and 5 ports, 2 major and 3 minor. The major ports, Puerto Barrios and Santo Tomas de Castilla, on the Bahia de Galvez about 4 miles distant from each other, share the only protected deep-water harbor in Guatemala. Economically they are important because their location affords the most direct maritime access to the United States and Europe. The facilities at Puerto Barrios were built and operated for the United Fruit Company by the International Railroads of Central America, now the government-owned Railroads of Guatemala. Santo Tomas de Castilla, opened in 1956, was built and operated by the government to free the country from dependence on the foreign-owned facilities at Puerto Barrios. Based on its estimated military port capacity, Santo Tomas de Castilla is now the largest port in Guatemala. Details of the major ports are listed in Figure 7.

FIGURE 6. Characteristics of principal inland waterways (C)

NAME	TYPE	NAVIGABLE LENGTH	SAFE DRAFT		REMARKS
			LW	HW	
		<i>Miles</i>	<i>Feet</i>		
Rio Sarstun.....	Improved stream...	37	8	12	Navigable by large flat-bottom craft to Modesto Mendez where cargo is transhipped to highway vehicles for movement to Peten plateau region.
Lago de Izabal system....	Natural streams and lakes.	90	3	5	Navigable by steamers drawing 8 feet, 55 miles inland to El Estor during high water (May to October). Navigable by barges and native craft to Panzos (mile 90) on Rio Polochic.
Rio Motagua.....	Natural stream.....	85	3	Navigable by large flat-bottomed craft to Gualan during high water; not navigable at low water.
Canal de Chiquimulilla....	Improved coastal lagoons.	37	5	5	Canal 30 ft. wide throughout. Used locally by fishermen and as trade route to San Jose.
Rio Usumacinta system...	Natural streams....	373	Rio de la Pasion navigable by native craft of 2-foot draft and Rio San Pedro by native craft of 2 1/2-foot during high water. Rio Usumacinta navigable for 125 miles along Mexico border.

FIGURE 7. Major ports (C)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Puerto Barrios 15°43'N., 88°36'W. 3,000	Important general-cargo port. Shipments—bananas, coffee, chicle, hardwoods, abaca. Receipts—manufactured goods, fabrics, paper, food, machinery, POL. Minor repair capability.	Well-sheltered natural harbor consisting of N. portion of Bahía de Galvez. Water area 4 sq. miles; berths rather than fairway leading to them limit size of vessels accommodated.	Alongside—5 standard, 1 small ocean-type cargo vessel; 1 small coaster-type cargo vessel; 3 standard ocean-type tankers. Fixed mooring—None. Anchorage—Numerous anchorages available for all classes.
Santo Tomas de Castilla 15°43'N., 88°37'W. 3,200	Government-owned-and-operated port; serves nearby refinery. Shipments—coffee, wood, minerals, chicle, sugar, bananas. Receipts—manufactured goods, automobiles, machinery, POL. Small naval facility. Repair barge available for patrol boats up to 65 ft. long. Syncrolift facility, construction beginning mid-1972.	Well-sheltered natural harbor consisting of S. portion of Bahía de Galvez. Water area 4 sq. miles, controlling depth in approach channel 27 ft.	Alongside—4 standard, 1 small ocean-type cargo vessel; 1 small ocean-type tanker; 3 PT's. Fixed mooring—None. Anchorage—Numerous anchorages available for all classes in Bahía de Galvez.

*The estimated military port capacity is the maximum amount of general cargo—expressed in long tons—that can be unloaded onto the wharves and cleared from the wharf aprons during a period of one 24-hour day (20 effective cargo-working hours). This estimate is based on the static cargo-transfer facilities of the port existing at the time the estimate is prepared and is designed for comparison rather than operational purposes; it cannot be projected beyond a single day by straight multiplication.

Livingston, the only minor port on the Caribbean coast, is at the mouth of the Rio Dulce northwest of Santo Tomas de Castilla; it has alongside berths for lighters only. A small shipyard at the port has three marine railways, the largest of which can handle 150-ton barges 110 ft. in length.

The other two minor ports, Champerico and San Jose, are on the Pacific coast and serve as the outlets for hardwoods and agricultural products of the Pacific slope. Receipts at these ports include machinery, manufactured goods, and processed foods; San Jose also handles bulk petroleum products. Champerico serves a large part of western Guatemala and has road and rail clearance inland. It can accommodate two small coaster-type cargo vessels alongside, and anchorage is available for vessels of all sizes. San Jose, the larger Pacific port, serves the capital with which it is connected by road and rail. Alongside berths are provided for two small coaster-type cargo vessels and three large ocean-type tankers; unlimited anchorage is available. A development program for the port of San Jose includes a new deep-water basin, wharfage, cranes, covered storage, and utilities. The Pacific ports, which have estimated military port capacities of only 400 long tons per day, have limited facilities but adequately meet normal requirements. The port system as a whole is somewhat better than that of Honduras and somewhat inferior to that of Nicaragua.

G. Merchant marine (C)

Guatemala's merchant fleet of ships of 1,000 gross register tons (g.r.t.) and over consists of two dry-cargo units totaling 3,629 g.r.t. or 5,500 deadweight tons (d.w.t.). The 14-year-old sisterships *Quetzaltenango* and *Gran Lempira* are diesel powered and have an operating speed of 13 knots; each has hatches 55 feet in length. About 90% of the country's international seaborne trade is carried by foreign shipping and about 10% by Guatemala-flag and foreign ships under Guatemalan charter.

Guatemalan-flag ships are owned and operated by *Flota Mercante Gran Centro Americana*, S.A. (FLOMERCA), in which the government owns majority shares. Foreign competition and FLOMERCA's inefficiency have resulted in its shipping operations being restricted to routes between Guatemala and U.S. east-coast and gulf ports and the Caribbean area.

Chief exports carried by Guatemalan-flag ships in international trade are coffee, cotton, and chemicals. Major imports are machinery, transport equipment, chemicals, and manufactured goods.

Merchant marine laws and regulations are administered by FLOMERCA and several government agencies. No direct operating subsidies are provided, but the government has at times absorbed losses sustained by FLOMERCA. Guatemalan legislation accords FLOMERCA preferential treatment and discriminates against foreign shipping. Government cargoes are reserved for FLOMERCA; all companies receiving benefits under the nation's industrial incentive laws are required to use national carriers when available to transport duty-free imports. Despite FLOMERCA's inability to carry these cargoes, the government has fined local importers using foreign shipping lines the full legal limit of one-half the freight cost.

H. Civil air (C)

Civil air transport in Guatemala has remained relatively undeveloped and is significant only in the sparsely settled jungles of the north where it is the only means of reliable travel. The nation's economy does not support the level of activity which would demand a comprehensive scheduled network of internal air services. Scheduled domestic air links are limited to the six-times-per-week services provided by the Guatemalan Aviation-Enterprise (*Empresa Guatemalteca de Aviacion—AVIATECA*), the government-owned airline, which links the capital with four towns, Coban, Flores, Tikal, and Melchor De Menos. International scheduled flights connecting Guatemala City with 26 cities in 16 countries are flown by AVIATECA and six foreign airlines. The foreign airlines carry the bulk of Guatemala's international air traffic. AVIATECA serves only four of the foreign cities, Miami, New Orleans, San Salvador, and San Pedro Sula, Honduras, and because of a lack of competitive aircraft, even this share of the market is small. The airline's acquisition of a BAC 111-500 jet should enhance its position but not markedly.

AVIATECA employs 485 personnel, including 29 multiengine rated pilots and 60 skilled maintenance personnel. Nine of the pilots are rated to fly the BAC 111. A poor equipment inservice rate has plagued AVIATECA for years and has prevented it from being an effective competitor on the international routes. Only 6 of the 11 major transport aircraft are generally in service at one time. The BAC 111 has achieved an excellent utilization rate, and AVIATECA relies on this single aircraft to serve the important international routes. Only one piston-engine Douglas DC-6B can be relied on for backup on the routes to the United States.

Guatemala's general-aviation establishment conducts a number of specialized services. Two companies,

Emergency Airservices and Commercial Airways of Guatemala, operate air-transport charter flights; 11 operators perform agricultural pest-control flights; and 9 companies and 5 government agencies operate aircraft in support of their various functions. These general-aviation operators use 90 light twin- and single-engine aircraft and employ a total of 192 persons, including 28 multiengine rated pilots and 37 skilled maintenance personnel.

A total of 702 persons is engaged in civil-aviation activities, including 210 pilots (58 rated to fly multiengine aircraft) and 97 skilled maintenance personnel. The 11 civil aircraft of at least 20,000 pounds gross weight registered in Guatemala are:

- | | |
|-----------------|-----------------|
| 1 BAC 111-500 | 1 Douglas DC-6A |
| 3 Douglas DC-3 | 1 Convair 440 |
| 4 Douglas DC-6B | 1 Curtiss C-46 |

The six operational are:

- | | |
|----------------|-------------------|
| 1 BAC 111-500 | 2 Douglas DC-6A/B |
| 2 Douglas DC-3 | 1 Convair 440 |

Domestic civil-aviation training programs are limited to those offered by the *Aero Club de Guatemala* and the programs conducted by AVIATECA supervisory personnel to insure flight-crew proficiency. AVIATECA flight-crew members who are air force officers received their flight training in the United States.

Guatemala's principal civil-maintenance facility is operated by AVIATECA at La Aurora International Airport where general engine and airframe repairs can be performed. Major maintenance is usually carried out in the United States or in Costa Rica. Two light-aircraft distributors are capable of performing maintenance on small-aircraft airframes and engines.

Guatemala is a member of the International Civil Aviation Organization (ICAO) and The Central American Corp. for Air Navigation Services (*La Corporacion Centro Americano de Servicios de Navegacion Aerea*—COCESNA), a regional organization which provides aeronautical telecommunications facilities for the area. Guatemala has no formal civil-aviation agreements with any nation, but informal or provisional arrangements provide for existing international services.

I. Airfields² (C)

The air facilities system of Guatemala, developed primarily for economic and civil operations, is

²For detailed information on airfields in Guatemala see Volume 3, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency, Aerospace Center, for the Defense Intelligence Agency.

composed of 496 airfields and one inactive seaplane station. Five airfields are joint military and civil, 329 are usable fields, one is under construction, and 165 are sites. The sites are unusable in their present condition.

The chief factor in the distribution of airfields lies in the defense and economic needs of the more populated areas. The heaviest concentration of air facilities is along the Pacific and northeastern coastal lowlands; the underdeveloped north and northwest areas, which comprise about 65% of the country, contain less than 20% of the airfields.

La Aurora, located on the southern outskirts of Guatemala City, is the international airport, headquarters of the Guatemalan Air Force (GAF), and the most completely developed airfield. It is used by DC-8 and Boeing 707 aircraft and houses the principal maintenance facilities for the GAF and the Guatemalan National Airline. It can support sustained operations of aircraft up to and including the C-135. About half of the facilities at La Aurora, including the old terminal building, are utilized by the military.

Five airfields, Flores, La Aurora, Puerto Barrios, Retalhuleu, and San Jose Nr 1, are jointly operated by civil and military authorities. Four of these airfields are permanent surfaced and have POL available. Only La Aurora has maintenance facilities capable of supporting sustained aircraft operations.

The 305 minor airfields have natural or graded-earth runways 2,000-3,000 feet in length. None have significant aircraft-maintenance facilities, and only a few have fuel. These fields primarily serve crop-dusting aircraft and planes which transport supplies to remote and isolated ranches.

The seaplane station of Puerto Barrios is inactive and has no facilities but is usable in emergencies. The airfield sites are in poor condition and would require considerable rehabilitation for future use.

Except at the four airfields having permanent-surfaced runways, very little airfield maintenance is performed. Most airfields are regraded only when they become too rough for safe operation. Details on facilities under construction at La Ceiba are not available.

The air facilities system of Guatemala is less effective than those of some of its neighboring Central American countries and is barely sufficient to meet the needs of the economy.

Figure 8 lists characteristics of the most important airfields.

J. Telecommunications (C)

Telecommunication (telecom) facilities rank with those of Honduras and Nicaragua—below the systems

FIGURE 8. Selected airfields (C)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE; DIMENSIONS; ELEVATION ABOVE SEA		ESWL*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	LEVEL				
	Feet	Pounds			
Dos Lagunas..... 17°41'N., 89°32'W.	Graded Earth..... 5,000 x 110 678	25,883	Curtiss Commando...	Civil. Allows access to remote area near Mexico border. POL not available.	
Flores..... 16°55'N., 89°53'W.	Gravel..... 3,690 x 95 380	28,160	C-54.....	Civil-military. Used by domestic airlines. POL not available.	
La Aurora..... 14°35'N., 90°32'W.	Asphalt..... 9,793 x 200 4,941	56,607	KC-135.....	Civil-military. International airport. POL available.	
Peten Itza..... 17°02'N., 89°39'W.	Graded Earth..... 5,249 x 197 1,000	28,160	DC-4.....	Civil. POL not available.	
Puerto Barrios..... 15°44'N., 88°35'W.	Concrete..... 6,000 x 80 7	28,160	C-54.....	Civil-military. Airport of entry. Used by domestic airlines. POL available.	
Quezaltenango..... 14°52'N., 91°30'W.	Graded Earth..... 7,546 x 175 7,872	28,160	DC-4.....	Civil. Served daily by scheduled airlines. POL not available.	
Retalhuleu..... 14°31'N., 91°42'W.	Asphalt..... 4,964 x 100 656	28,160	C-54.....	Civil-military. Used by domestic airlines. POL available.	
San Jose Nr 1..... 13°56'N., 90°50'W.	Asphalt..... 5,160 x 150 21	28,160	C-54.....	Civil-military. Airport of entry. POL available.	
Zacapa..... 14°58'N., 89°32'W.	Graded Earth..... 3,200 x 246 623	14,200	DC-3.....	Civil. Support of adjacent military zone headquarters. POL not available.	

*Equivalent Single-Wheel Loading: Capacity of an airfield runway to sustain the weight of any multiple-wheel landing-gear aircraft in terms of the single-wheel equivalent.

of other Central American nations in efficiency, degree of development, and adequacy in meeting the national demand. All public telecom facilities are controlled by the Ministry of Communications and Public Works and are operated by the Guatemalan Telecommunications Enterprise (*Empresa Guatemalteca de Telecomunicaciones*—GUADEL), an autonomous agency to which in April, 1971, was assigned the responsibility for all telecom except the domestic telegraph system. The latter is the responsibility of the national postal system.

Domestic intercity traffic is carried over extensive open-wire telephone and telegraph networks. Wireline routes extend east, south, and west from the capital, covering the southern section of the country. Carrier equipment provides 12-channel telephone and telegraph service between Guatemala City and Antigua Guatemala, and 3-channel equipment carries telephone and telegraph traffic from the capital to 4 other cities. All other open-wire lines are single-

channel links; these facilities are poorly maintained and are totally inadequate to meet the public demand. Siemens and Halske (West Germany) automatic telephone exchanges serve 7 cities; 6 of these exchanges have capacities over 1,000 lines. There are 41,000 telephones in the country, most of which are in the capital. Guatemala ranks sixth among the Central American countries (including Mexico) in telephone density and has a ratio of 0.77 telephones per 100 inhabitants. The open-wire telegraph system is fairly extensive and largely interconnected with the telephone system, but for the most part it is ineffective. Equipment serving the 326 telegraph offices is in poor condition, and practically no maintenance is performed. High-frequency radiotelephone and radiotelegraph circuits provide service from the key radiocommunication station in the capital to 14 towns. Telex service, available only in the capital and Quezaltenango, serves some 260 subscribers.

International telecom service is provided by HF radiocommunication and radio-relay circuits and by open-wire lines. Through these media GUATEL offers telephone, telegraph, and teleprinter communications with Mexico, Panama, the United States, and four Central American countries. Circuits are keyed from stations operating in the capital, Puerto Barrios, and Tiquisate. International landlines are a continuation of the domestic wire networks; they include one 12-channel carrier-equipped open-wire line into El Salvador, two single-channel lines to Honduras, and one 16-channel carrier-equipped landline extending into Mexico. Service over the new 960-channel, Central American microwave net started in November, 1971. This system has seven relay stations and provides for telephone, telex, telegraph, and radiobroadcast service, and a reserve circuit for television.

Private wire facilities are operated by the Railroads of Guatemala. Special-service HF and VHF radiocommunication facilities are operated by the government and several commercial firms. COCESNA operates a 24-channel VHF radio-relay system for aeronautical operations between Guatemala and the Central American countries, of which 12 channels provide public toll telephone circuits. Other important networks are those of the Ministry of National Defense, the National Police, the Ministry of Agriculture, and the 24-station HF network operated by the National Agricultural Development Bank (BANDESA). Domestic aeronautical communications are maintained by AVIATECA, Pan American Airways, and by the Directorate General of Civil Aeronautics.

Eighty-one AM stations, which have powers ranging up to 20 kilowatts, provide nearly nationwide coverage. Thirty-six of these stations are located in the capital city, and, while most of the stations broadcast only on medium frequencies, some stations in more

remote locations broadcast only on shortwave. A total of 19 FM stations serve the capital city, Retalhuleu and Quezaltenango and have powers ranging up to 100 watts. An estimated 360,000 radiobroadcast receivers are distributed throughout the country. TV broadcast is available only in the area of the capital; programs from one government and two private stations are received on some 90,000 sets.

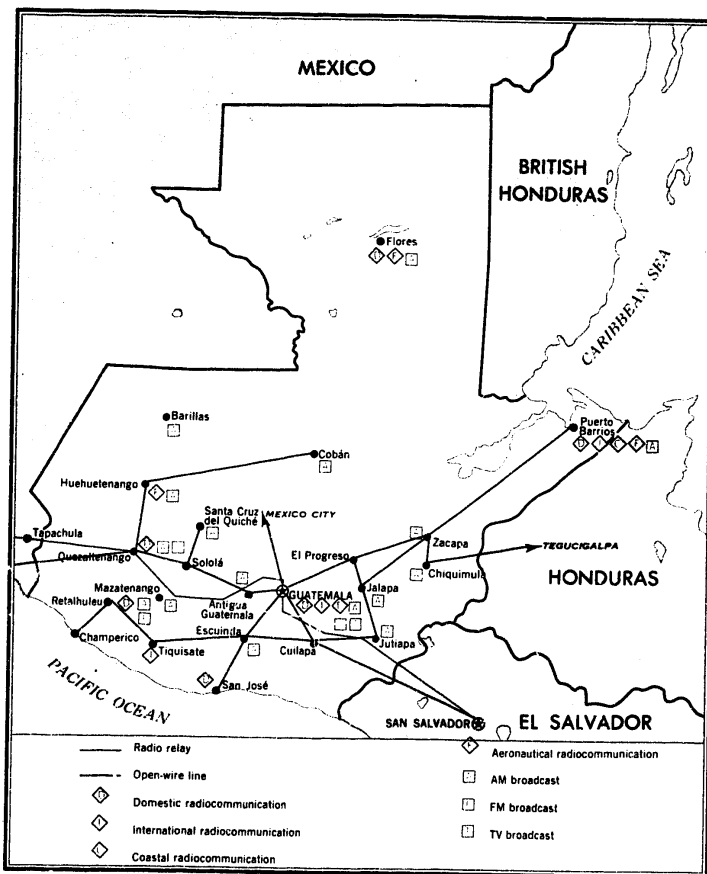
Construction and maintenance on long-distance wire-line routes are hampered by rough terrain. Equipment must be tropicalized in many areas. Guatemala does not manufacture telecom equipment, but small-scale assembly operations of radiobroadcast and TV receivers from components imported primarily from Japan is performed. The leading supplier of radiocommunication equipment, broadcast transmitters, and television receivers is the United States. Japan is the second major source of radio and television receivers. Most of the wire-line equipment comes from West Germany; the Netherlands and Sweden furnish moderate amounts. The small number of telecom technicians is barely adequate to meet national needs. Training is limited to on-the-job instruction; only a few engineers are afforded the opportunity of study abroad.

Development of telecommunications has lagged behind demand. Work is now in progress to complete secondary radio-relay links in western Guatemala into the COMTELCA trunk system. The 1971-75 comprehensive development plan has programmed \$30.5 million for the improvement of all telecommunications. Specific projects include installation of 35,000 local telephone lines and an equal number of long-distance connections, construction of a low-capacity radio-relay system between Guatemala City, Zacapa, and Puerto Barrios, and investigation into the feasibility of a communications satellite ground station in the vicinity of Zacapa.

The general telecom pattern is shown in Figure 9.

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FIGURE 9. General telecom pattern, 1972 (C)



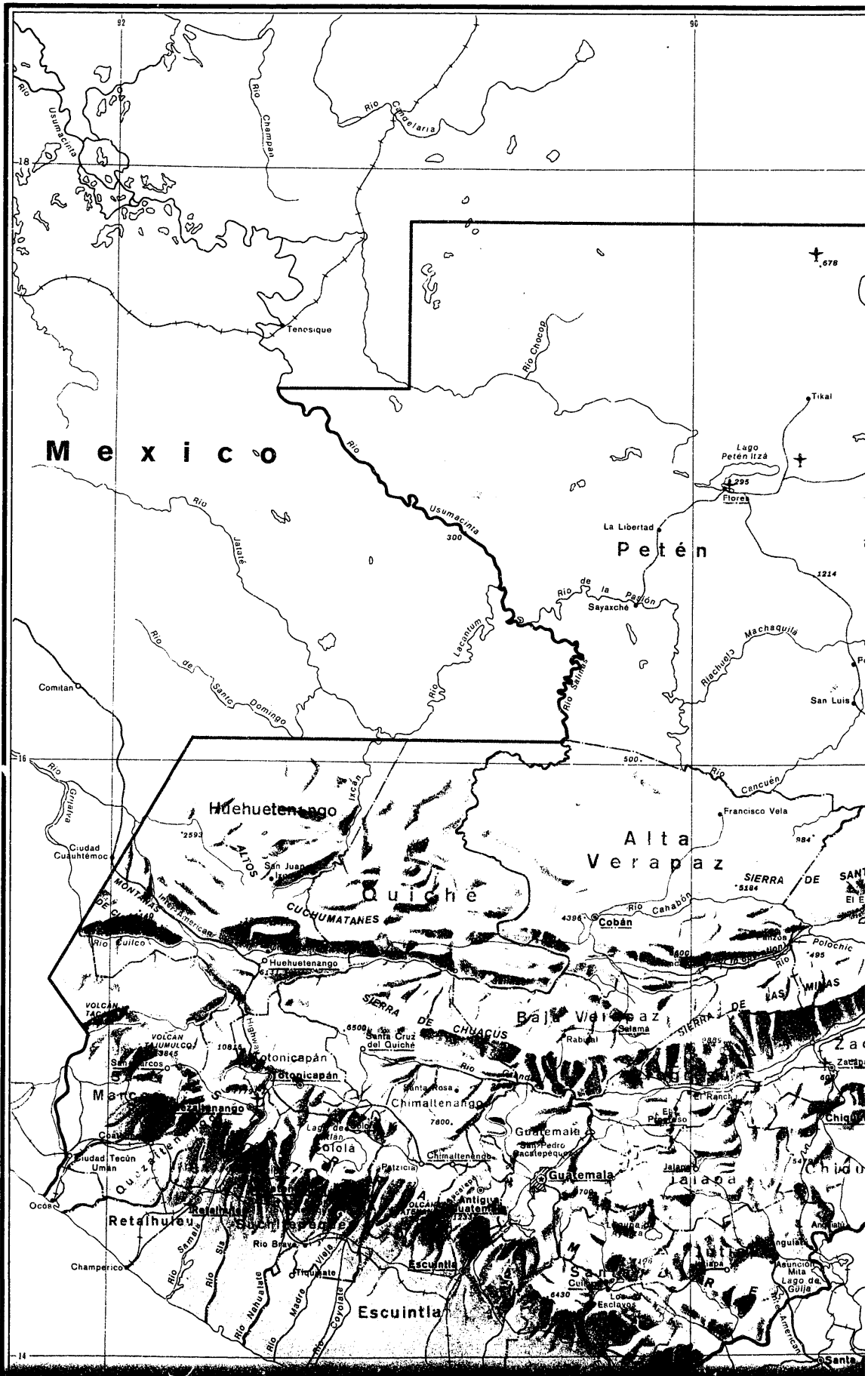
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Places and features referred to in this General Survey (U/OU)

	COORDINATES				COORDINATES		
	°	'N.	'W.		°	'N.	'W.
Anguiatú.....	14	21	89 35	Poptún.....	16	21	89 26
Antigua Guatemala.....	14	34	90 44	Puerto Barrios.....	15	43	88 36
Bahía de Amatique (bay).....	15	55	88 45	Quezaltenango.....	14	50	91 31
Bahía de Gálvez (bay).....	15	42	88 38	Quiriguá.....	15	16	89 05
Bananera.....	15	28	88 50	Retalhuleu.....	14	32	91 41
Barillas.....	15	48	91 18	Río Chixoy (stream).....	16	04	90 24
Canal de Chiquimulilla (canal).....	13	55	91 07	Río de la Pasión (stream).....	16	28	90 33
Cantel.....	14	49	91 27	Río Dulce (stream).....	15	49	88 45
Champerico.....	14	18	91 55	Río Hondo.....	15	10	91 25
Chichicastenango.....	14	56	91 07	Río Motagua (stream).....	15	44	88 14
Chickasaw (locality).....	15	20	88 56	Río Polochic (stream).....	15	28	89 22
Chimultenango.....	14	40	90 49	Río Salinas (stream).....	16	28	90 33
Chiquimula.....	14	48	89 33	Río San Pedro (stream).....	17	46	91 26
Ciudad Tecún Umán.....	14	40	92 09	Río Sarstún (stream).....	15	54	88 54
Coatepeque.....	14	42	91 52	Río Usumacinta (stream).....	18	24	92 38
Cobán.....	15	29	90 19	San Cristóbal Verapaz.....	15	23	90 24
Cuilapa.....	14	17	90 18	San José.....	13	55	90 49
Dos Lagunas.....	17	42	89 36	San Juan Ixeoy.....	15	36	91 27
El Estor.....	15	32	89 21	San Juan Sacatepéquez.....	14	43	90 39
El Progreso.....	14	51	90 04	San Marcos.....	14	58	91 48
El Rancho.....	14	55	90 00	Santa Cruz del Quiché.....	15	02	91 08
Escuintla.....	14	18	90 47	Santiago Atitlán.....	14	38	91 14
Esquipulas.....	14	34	89 21	Santo Tomás de Castilla.....	15	42	88 37
Flores.....	16	56	89 53	Sayaxché.....	16	31	90 10
Guplán.....	15	08	89 22	Sebol (archeological site).....	15	47	89 56
Guatemala City (or Guatemala).....	14	38	90 31	Sipacate.....	13	58	91 09
Gulf of Honduras (gulf).....	16	10	87 50	Sololá.....	14	46	91 11
Huehuetenango.....	15	20	91 28	Tapachula, Mexico.....	14	54	92 17
Ixcán (locality).....	15	49	91 04	Tikal.....	17	20	89 39
Izabal.....	15	24	89 08	Tiquisate.....	14	17	91 22
Jalapa.....	14	38	89 59	Totoncapán.....	14	55	91 22
Jutiapa.....	14	17	89 54	Uspantán.....	15	23	90 50
Lago de Atitlán (lake).....	14	42	91 12	Zacapa.....	14	58	89 32
Lago de Izabal (lake).....	15	30	89 10				
Las Casas.....	15	12	90 56	Selected airfields			
Livingston.....	15	50	88 45	Dos Lagunas.....	17	41	89 32
Los Cipresales.....	14	47	90 47	Flores.....	16	55	89 53
Mazatenango.....	14	32	91 30	La Aurora.....	14	35	90 32
Melchor de Mencos.....	17	04	89 10	Peten Itza.....	17	02	89 39
Miramundo.....	14	33	90 06	Puerto Barrios.....	15	44	88 35
Modesto Méndez.....	15	53	89 13	Quezaltenango.....	14	52	91 30
Momostenango.....	15	04	91 24	Retalhuleu.....	14	31	91 12
Morales.....	15	29	88 49	San Jose Nr 1.....	13	58	90 50
Panzós.....	15	24	89 40	Zacapa.....	14	58	89 32
Petén.....	14	37	90 17				

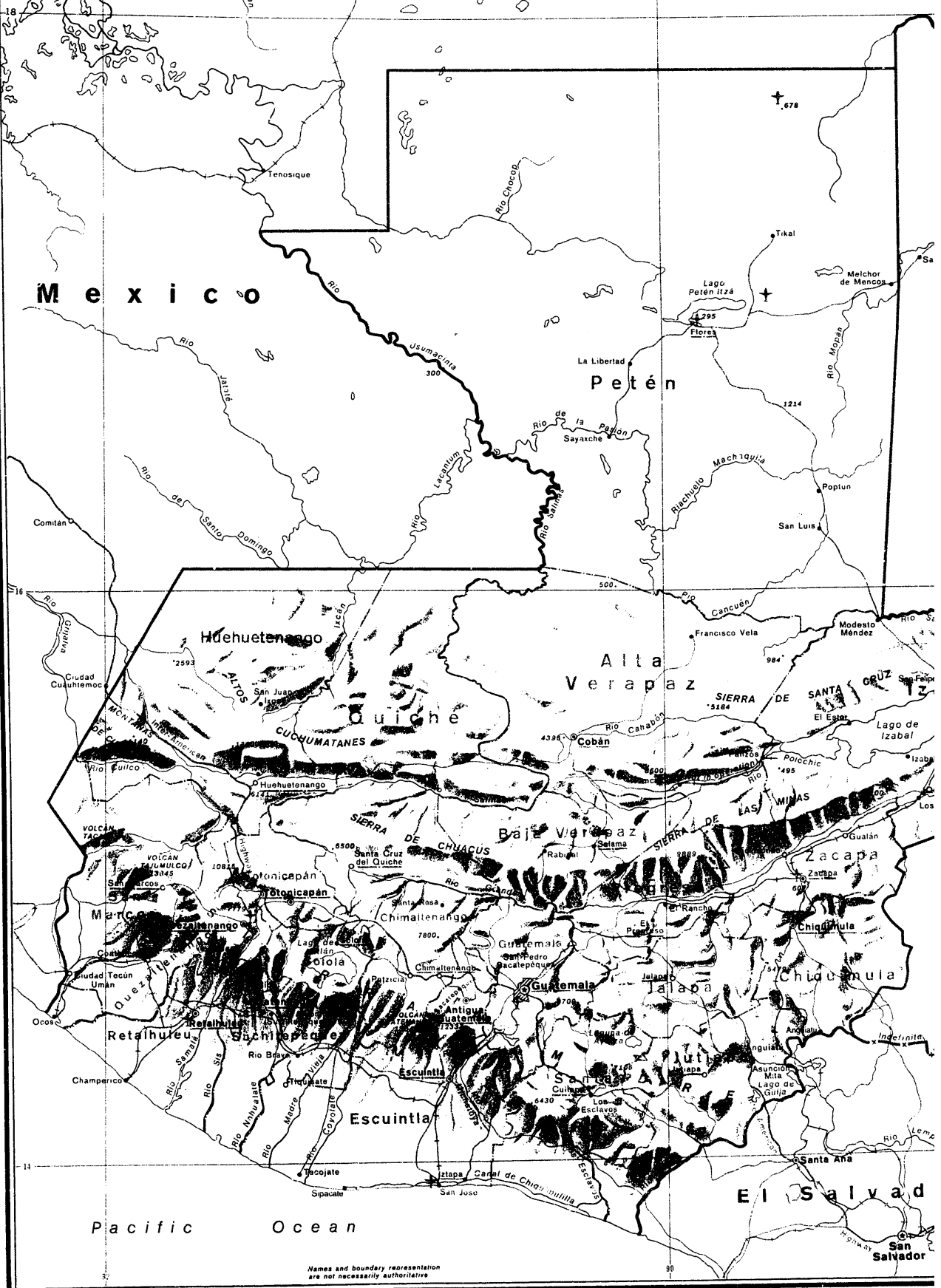
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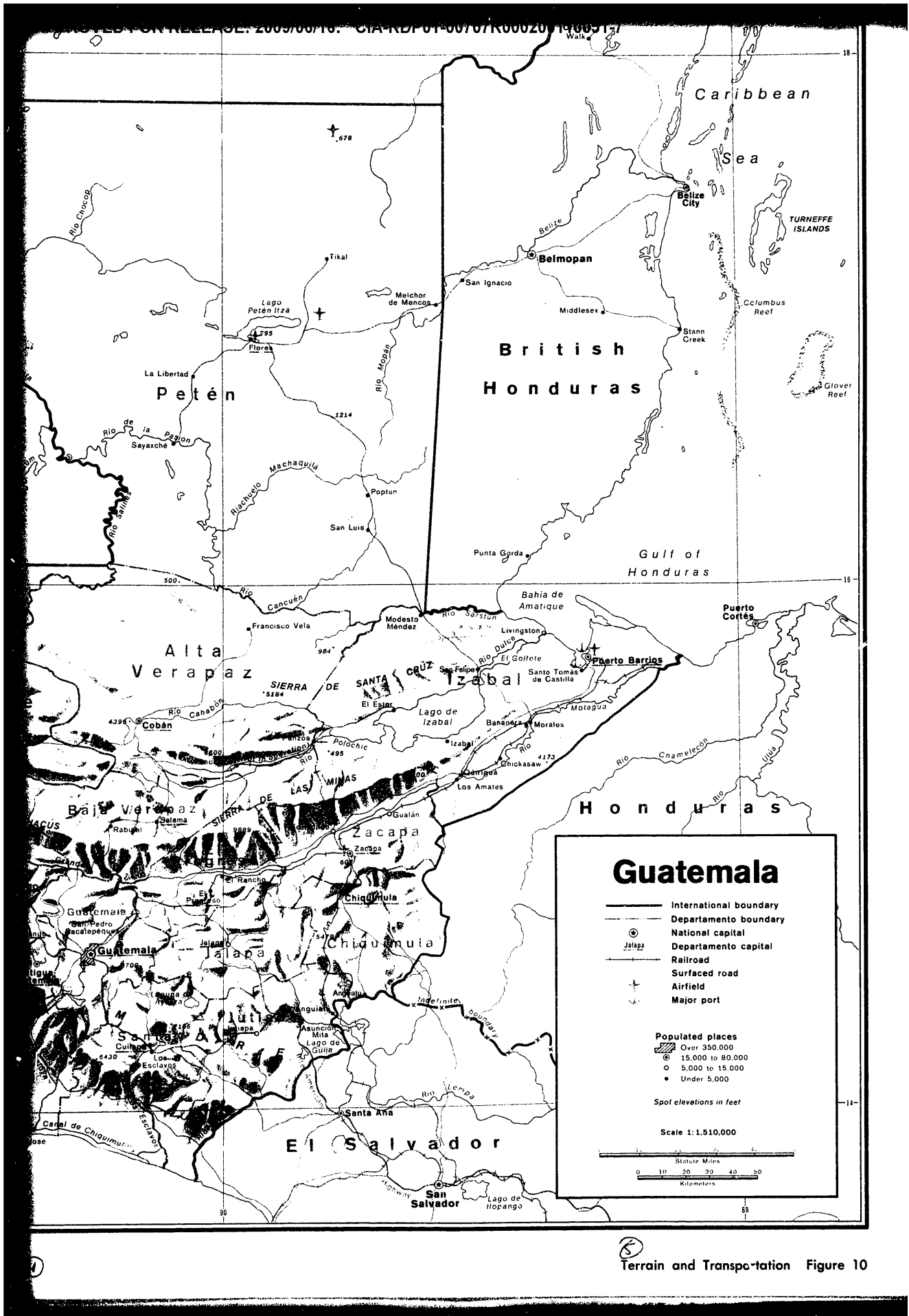
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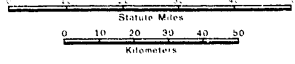
Guatemala

- International boundary
- - - Departamento boundary
- ⊙ National capital
- ⊙ Jalapa Departamento capital
- Railroad
- Surfaced road
- + Airfield
- ⊙ Major port

- Populated places
- ▨ Over 350,000
 - ⊙ 15,000 to 80,000
 - 5,000 to 15,000
 - Under 5,000

Spot elevations in feet

Scale 1:1,510,000



Terrain and Transportation Figure 10

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