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Transportation and Telecommunications

Iran

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NATIONAL INTELLIGENCE SURVEY

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NATIONAL INTELLIGENCE SURVEY PUBLICATIONS

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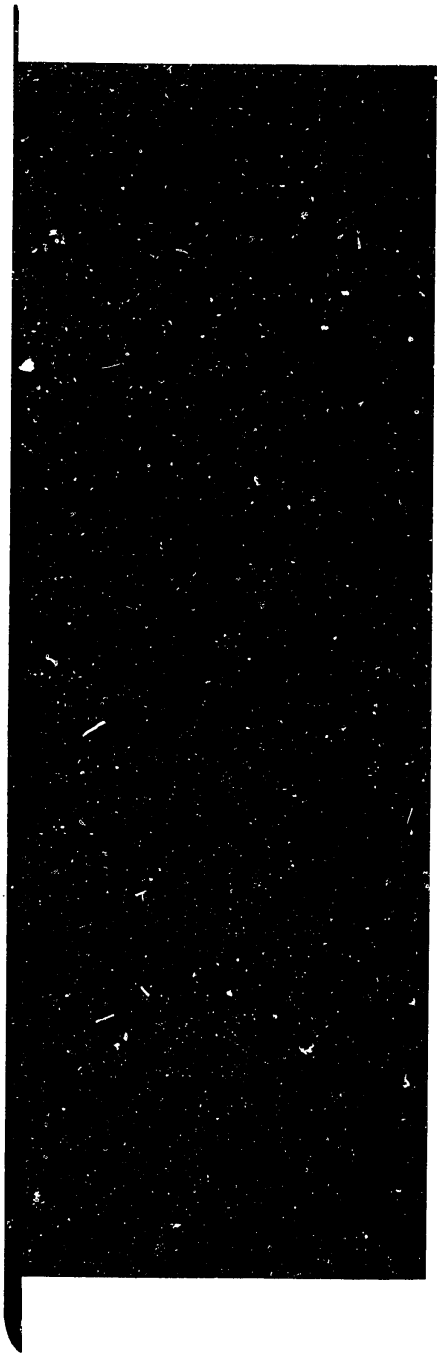
This chapter was prepared for the NIS by the Defense Intelligence Agency and includes contributions on merchant marine from the Department of the Navy and on airfields from the Defense Mapping Agency. Research was substantially completed by January 1973.

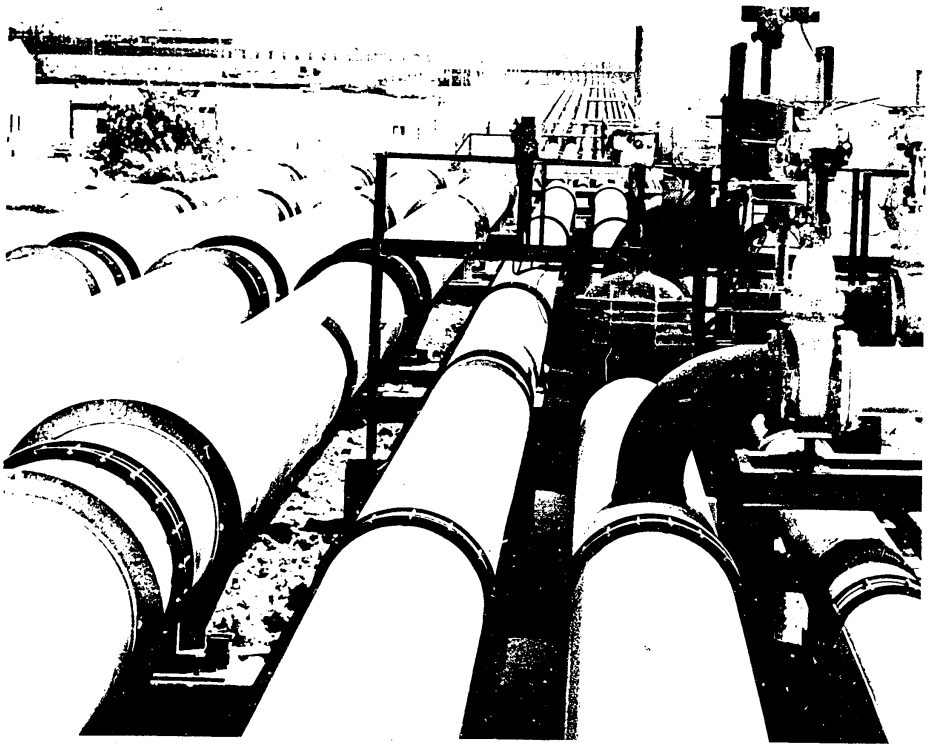


Iran

CONTENTS

This General Survey supersedes the one dated November 1969, copies of which should be destroyed.

FIGURES



Transportation and Telecommunications

A. Summary (C)

1. Systems

The transportation and telecommunications (telecom) systems of Iran are generally adequate for peacetime needs and compare favorably with those of neighboring Middle Eastern countries. The systems are concentrated in the north and west; the southern and eastern parts have chiefly desert tracks usable only during dry weather. The systems traverse rugged mountains and broad deserts. Development has been mostly on a north-south axis connecting the Persian Gulf area with the relatively heavily populated and commercially active north (Figure 11, the map at the end of the chapter). Because eastern Iran is generally barren and sparsely populated, development of the systems there has been less urgent.

The rail, highway, and port systems are greatly dependent upon each other. Railroads are the leading long-haul mode and carry heavy freight between the Persian Gulf ports and the major populated and industrial areas. The highway system, which has undergone continuous improvement and development, supplements the rail system, constitutes the major distribution mode for short-haul traffic, and serves the outlying areas of the country. In extensive areas of Iran, highways are the only means of transportation, and the trucking industry is large and well developed.

Inland waterway transport plays a minor role. Its economic significance is limited to moving equipment, supplies, and personnel in support of the petroleum industry. The pipeline network includes the largest system for refined products in the Middle East, as well as a crude-oil system capable of handling the second largest crude-oil production in the Middle East. Iran's small merchant marine plays a minor role. The civil air transport system, a significant factor in the Iranian economy, is the only method of linking numerous domestic points otherwise isolated by long distances, mountainous terrain, and inadequate surface systems.

Telecom facilities are generally good, and certain local services in major urban areas are excellent. Intercity telecom service is not altogether adequate because long-distance facilities are not invariably connected to local systems and because there is a severe shortage of trunk circuits. With the completion of an INTELSAT ground receiver station in October 1969, international telecommunications became excellent.

The transportation systems are connected with those of adjacent countries. Hafar Channel connects the Rud-e Karun (Karun river)[1] with the Shatt al Arab of Iraq. The Caspian Sea is used jointly by the U.S.S.R. and Iran. The civil air system includes service to 17 foreign cities, and highways provide international connections with all neighboring countries. The railroad system connects with Turkey near Qotur, and with the Soviet Union at Jolfa where a change of track gage requires transloading. Since the closing of the Suez Canal, these connections have become increasingly important on alternative routes. The other international rail connection is with Pakistan, 6 miles east of Mirjaveh; however, this line does not connect with the major Iranian system. Current plans include extending the southeastern line to connect with the branch from Pakistan.

The transportation and telecom networks are controlled and administered by the central government chiefly through the Ministry of Roads and Communications, and the Ministry of Post, Telegraph, and Telephone. Iran has undertaken an

[1] For diacritics on place names see the list of names on the apron of the Terrain and Transportation Map and the map itself.

ambitious program to upgrade all transportation and telecom systems. Railroad maintenance and training programs are expected to continue at the present high level, and the extension of a line into Pakistan will improve the system's geographic coverage. Under the current plan for highways, the emphasis will be on upgrading existing roads and improving feeder roads to new agricultural areas. In addition, the international routes are being resurfaced under the auspices of CENTO. The government, in implementing its interest in developing a stronger merchant marine, established a maritime academy in 1970. The civil air system is expected to improve with continued emphasis on increased air routes and upgrading of facilities. Other projects planned include developing the telecom system into one of the world's best. Pipeline construction continues to expand with the increased production of crude and refined products, and in addition, exploitation of Iran's natural gas resources is rapidly increasing in importance. Construction of several extensive natural gas pipelines has already begun.

2. Strategic mobility

The capability of the Iranian transportation system to support large-scale military operations would be severly limited by a lack of alternate routes and by poor distribution of roads and rail lines in large sections of the country. The Iran State Railway is capable of transporting heavy freight between the Persian Gulf and the major industrial and populated areas of the country. Priorities would be required during a major military conflict because the system could not provide for both military and economic needs.

Clearance difficulties are of major concern on the Iranian rail network. Most rail routes have structures that prevent the movement of the largest military equipment. A continuous high-quality maintenance program, however, keeps the network in good condition and has upgraded the standard-gage system to a 21-short ton maximum axleload.

Numerous structures on single-track lines, a lack of alternate lines, and long distances through rugged terrain make the system particularly vulnerable to interdiction. The density of structures is the highest in the world, with 5.7 per mile.

The lack of east-west lines between Iran and Iraq is the most severe operational weakness in the Iran State Railways' capability to support military operations.

The capability of the highway network to support sustained military resupply operations would be limited by the lack of alternate through routes, the existence of bottleneck features, and the adverse effects of climate. Unbridged wadies, fords, ferries, narrow bridges, snow blockage, flooding, and difficult alignment in the mountainous terrain would impede operations. Adequate road connections, however, exist with all neighboring countries.

Much of the 565 miles of navigable waterways within Iran is hampered by excessive silting during high water. Waterways have little potential for military use. The major maritime ports could be used for military purposes; however, all have vulnerable estuarial locations.

Iran's pipeline system could be used by military forces. However, interdiction of the pipeline system could disrupt the economy and diminish its capability to sustain long-range military operations.

Iran's merchant fleet has 15 ships of 1,000 g.r.t. or over, totaling about 219,000 d.w.t. Eleven dry-cargo ships have a modest potential for short-haul (up to 48 hours steaming) troop-lift and sustained logistics support in nearseas operations. These ships have a military lift and supply transport potential of 130,927 cargo deadweight tons. Of the eight units having self-loading and unloading capability, six have heavy-lift booms ranging from 100 to 200 tons capacity, hatches of 72 feet in length, and service speeds of 19 knots. The four tankers, with an estimated capacity of about 589,600 barrels (U.S.) of petroleum, could provide a modest fleet-oiler support capability for a short period.

The 140 civil aircraft registered in the country, including personnel, would be available to the government in the event of a national emergency. A lack of indigenous pilots and other skilled personnel would limit operations if Iran National Airline's foreign employees were withdrawn.

Five major airports are capable of supporting C-141 aircraft. Six other airports are capable of handling C-130 aircraft. These fields have maintenance and support facilities, including jet fuel and avgas supply capabilities, and can support sustained operations.

The strength and diversity of the telecom system would make it of great importance during military operations. Installations are vulnerable because of the vast territory and scarcity of troops to guard them. Upon completion of present projects, a greater number of alternate routes will be available for military use.

B. Railroads (C)

The Iranian railroad network consists of 2,932 route miles of single-track lines. The government-owned Iran State Railways operates 2,875 route miles of standard-gage (4'8½") lines and 57 route miles of

5'6" broad-gage line. Railroads serve primarily to move freight between the Persian Gulf ports and Tehran. Since the closure of the Suez Canal, there has been an increased volume of rail traffic from Eastern and Western Europe and the U.S.S.R. through Jolfa to Tehran. Major lines also extend east and northwest from Tehran. The rail network is capable of carrying heavy military equipment and troops; however, its sparseness, limited distribution, the existence of numerous structures, and the lack of alternate routes would be limiting factors. Good connections between rail lines and highways afford access to most sections of the country.

The rail network radiates from Tehran; the major line extends south to the port of Bandar-e Shahpur, with branch lines from Ahvaz to Khorramshahr and from Qom to Yazd with spur lines to Esfahan and the steel mill at Riz. A second line extends west from Tehran then northwest to the Jolfa transloading facility where a connection is made with the U.S.S.R. 5'0"-gage line. A branch of this line from Sufian, built under the sponsorship of the Central Treaty Organization (CENTO), connects with the Turkish standard-gage system. A third line from Tehran extends east to Mashhad, with a branch to Gorgan. A 5'6" broad-gage line from Pakistan extends to Zahedan. This 57 route-mile line has no connection with the Iran State Railways.

The greatest volume of rail traffic is generated between the Persian Gulf ports and Tehran, consisting of loaded cars moving north and empties returning south. Because of the increased volume of traffic handled at Jolfa, major improvements and additions to transloading facilities have been made there.

The Iran State Railways is operated under the direction of the Ministry of Roads and Communications. It is managed by a Director General, who exercises responsibilities for rail operations through a council composed of three department directors. The system is organized into 10 operating and administrative divisions. As of 1 January 1972, the staff of the Iran State Railways numbered 29,184, a reduction of 483 employees from 1970. The staff, which is competent and well trained, provides adequate maintenance and efficient operations. Personnel have been trained in the United States and Europe for the repair, maintenance, and operation of diesel equipment. Some of the foreign-trained personnel have been assigned to a training school at Tehran. This staff also conducts an on-the-job training program for new railroad personnel in several shops throughout the country.

The major rail facilities are located at Tehran, Ahvaz, Khorramshahr, Bandar-e Shahpur, Mashhad, Tabriz, and Jolfa. Major repairs are made at Tehran, where there are also facilities for assembling rolling stock.

The topography of Iran requires a great number of tunnels and bridges. There are 11,732 bridges, of which 456 are 100 feet and over; the longest is a single-track 3,468-foot deck-girder structure (Figure 1) crossing the Rud-e Karun near Ahvaz on the Tehran to Bandar-e Shahpur line. In mountainous terrain, most bridges are masonry-arch construction; in areas with more gentle slopes, bridges are usually steel on masonry piers. There are 268 tunnels on the Iran State Railways system, the longest being a 9,462-foot single-track structure located about 10 miles northeast of Firuz Kuh. Tunnels are usually not lined or ventilated.

The absolute block system of train control is in force. The token and instrument method for traffic control is still in use on some lines, but the Iran State Railways has adopted an automatic signal control system and all main-line diesel locomotives have been fitted with a simplified automatic signal warning device, which checks the alertness of the locomotive engineer as he approaches a signal. Distant and home signals are of the semaphore type, and rail switches are operated electrically. A telephone network provides communications between stations, and teletype and radio telephone circuits are installed at the major rail centers.

The motive-power inventory consists of 217 diesel-electric locomotives, of which 156 are used for main-line operations. The predominant type is the 43-foot long General Motors G-12, B-B, 1,425-horsepower locomotive with a continuous tractive effort of 22,000 pounds at 19 miles per hour. In addition, about 50 diesel locomotives of much greater horsepower have been purchased from the United States for operating on lines serving the Qom-Esfahan-Zarand area, where heavy ore and steel product trains are operating. Nearly 1,000 special cars for ore transport have also been purchased.

The freight-car pool totals 6,893 cars, of which about 1,800 are 4-axle cars, and the remainder have two axles. The average capacity of freight cars is 27.9 short tons. The rolling stock inventory includes:

Type	No. of cars	Average short ton capacity
Box cars	2,900	22.7
Gondolas	1,656	25.2
Tank cars	1,104	42.3
Flat cars	763	27.4
Others	470	Not pertinent
Passenger cars	461	*Do.*

The main sources for rolling stock are the United Kingdom and Eastern European countries. Rolling

FIGURE 1. Railroad bridge over the Rud-e Karun at Ahvaz. The bridge rests upon the foundation of the great weir built by Shapur II in the fourth century A.D. (U/OU)

stock is equipped with air brakes, standard European hook-and-link couplers placed 12 inches above top of rail, and side buffers spaced 5 feet 9 inches apart and 12 inches above top of rail. About 10% of all cars are normally in repair shops for maintenance. Adequate supplies of diesel fuel are available domestically.

Construction and maintenance of rail lines are hampered by the topography and adverse climatic conditions. Rugged mountainous terrain requires extensive grading and the construction of retaining walls, tunnels, and bridges. Heavy snowfall in the mountainous areas often causes blockage of lines. During the rainy season, landslides and washouts cause damage which may require extensive repair and reconstruction. Drifting sand presents some maintenance problems in the desert areas.

The Iran State Railways has made significant improvements to the rail system in recent years. The most important of these has been the total conversion to diesel motive power, which has provided faster, more economical, and more efficient rail transportation. Track upgrading and replacement has been a continuing program. The primary development project underway is the building of a line from Yazd to Kerman; it is believed that the line has been completed in Zarand. Future plans call for the extension of this line to connect with the 5'6"-gage Pakistan system at transloading facilities near the border. Another line is also to be extended from Kerman south to the port of Bandar 'Abbas. Other projects which have been considered for inclusion in the fifth Development Plan (1973-78) are the construction of an additional rail connection between the U.S.S.R. and Iran at Astara; the electrification of the Tabriz–Jolfa line; and the extension of the Tehran–Mashhad line to the Afghanistan border.

Projects completed in 1971 included the Turkey-Iran CENTO rail link, and the extension of the line southeast from Kashan to Yazd, including two spur lines to the steel mill at Riz.

Between 1969 and 1970 freight tons carried decreased only slightly, while freight ton-miles increased by 13%. During the same period passengers transported increased by 3% and passenger-miles were up by 8%. Official revenue traffic statistics, in thousands, for the 1968-70 period are as follows:

	1968	1969	1970
Freight:			
Short tons	3,825	3,960	3,954
Short-ton-miles	1,322,118	1,315,837	1,495,698
Passengers	3,416	3,717	3,839
Passenger-miles	910,036	1,045,825	1,133,320

Agricultural products have overtaken oil as the top rail commodity carried. Cotton and fruits are the major exports, and chemicals and machinery the main imports carried by the railroads. Because of improper cargo handling by the Iran State Railways, a large percentage of cargo is damaged in transit.

Problems related to poor equipment maintenance have been overcome since the complete dieselization of the Iran State Railways and the implementation of the training program. Major operational problems are attributable to the existence of numerous structures with limited clearances, steep grades, sharp curves, snow, ice, landslides, and seasonal flooding.

FIGURE 2. Characteristics of selected single-track standard-gage rail lines (C)

TERMINALS	ROUTE MILES	MAXIMUM GRADE		MINIMUM RADIUS OF CURVATURE	PASSING TRACK		REMARKS
		Going	Coming		Maximum interval	Minimum length	
		Percent		*Feet*	*Miles*	*Feet*	
Tehran–Bandar-e Shahpur	576	1.7	1.5	715	14	1,325	Provides major Persian Gulf port connection.
Tehran–Gorgan	308	2.8	2.8	721	16	1,200	
Garmsar–Mashhad	504	1.5	1.5	984	15	1,200	
Qom–Esfahan–Riz	286	0.7	0.7	*na*	10	1,738	
Bad–Yazd–Zarand	335	*na*	*na*	*na*	*na*	*na*	Under construction to Kerman, believed completed to Zarand, with planned extensions to Zahedan and Bandar 'Abbas.
Tehran–Jolfa	552	1.5	1.0	820	15	1,440	International connection with the U.S.S.R. Transloading necessary at Jolfa.
Ahvaz–Khorramshahr	76	0.2	0.5	715	13	1,640	Provides connection to Iranian port on Shatt al Arab.
Sulīian–Qotur	85	1.5	1.5	*na*	10	1,440	Line operational into Turkey. Built under the sponsorship of CENTO.

na Data not available.

The Iran State Railways operated at a profit through the 1960's; however, since 1970 they have operated at a deficit. Receipts totaled US$52.9 million in 1971 and expenditures US$55.9 million, resulting in an operating ratio of 105.6.

Track structure has been greatly improved in recent years. T-section rail, of various types, is used throughout the country. The standard types found on main lines are 92.8 pounds per yard in 41-foot lengths, 77 pounds per yard in 41-foot lengths, and 67 pounds per yard in 39¾-foot lengths. Branch lines use 62 pounds per yard in 42-foot lengths and 70 pounds per yard in 32¾-foot lengths. All rail is thermit welded into 123-foot lengths, and the welded sections are joined by fish plates.

About 70% of all ties are creosote-impregnated hardwood, 25% are steel, and 5% are concrete. On new-line construction and tie replacement the Iran State Railways uses domestically produced two-section reinforced-concrete ties. Wooden ties are spaced at 2,180 per mile, steel ties at 2,320 per mile, and concrete at 2,700 per mile. Tie plates, which are secured by screw spikes and bolts, are used to fasten rail to wooden ties. Rail is secured to steel ties by clips and bolts. Crushed stone and gravel are used for ballast, with a minimum depth of 7⅞ inches.

Characteristics of selected standard-gage Iran State Railways lines are given in Figure 2.

C. Highways (C)

The pattern and distribution of the Iranian highway system have been greatly influenced by geographic factors. Highways are densest in the populated and commercial northern and western parts of the country; roads are sparse in the desert region of the eastern half of the country. The network density of 0.04 mile of highway per square mile of area is unfavorable compared with the adjacent countries of Turkey, Iraq, Pakistan, and Afghanistan. The arterial network focuses on Tehran where routes radiate to all major cities and ports; however, many isolated areas lack feeder roads. The principal north-south routes are those linking Tehran with major Persian Gulf ports. The principal east-west routes include the road from Tehran to Mashhad and the Trans-Asian or Central Treaty Organization (CENTO) road from the Turkish border to the Pakistan border via Tabriz and Kerman. Roads afford international connections with all neighboring countries.

The highway network totals about 26,500 miles, consisting of 7,100 miles of bituminous or bituminous-treated surfaces, 12,900 miles of gravel (Figure 3), crushed stone, or improved earth; and 6,500 miles of earth roads and nontorable tracks. Additionally, the National Iranian Oil Co. (NIOC) maintains over 500 miles of service roads which provide access to oilfields and installations. The general condition of the highway network ranges from poor to good. National highways are the primary routes and generally have bituminous or bituminous-treated surfaces, 12 to 36 feet wide, with a gravel or crushed-stone base 6 to 8 inches thick. Secondary roads link smaller towns with the provincial capitals; in general, these roads have bituminous-treated or gravel surfaces ranging from 10 to 28 feet in width. Third class roads connecting rural villages with provincial towns are of improved or unimproved earth, 7 to 22 feet wide. Shoulders, where they exist, are gravel or earth up to 6 feet wide; however, 2- to 3-foot shoulders are most common.

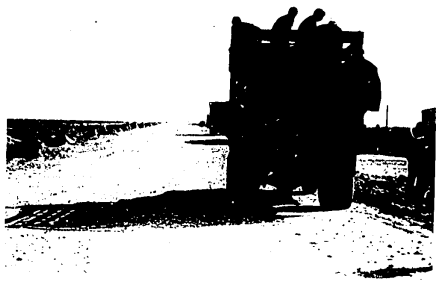


FIGURE 3. Gravel road near Bojnurd in northeast Iran (U/OU)

There are about 700 highway bridges 20 feet or over in length on the network. About 90% of the bridges are of masonry-arch or reinforced-concrete construction with individual span lengths ranging from 6 to 175 feet; masonry bridges are of arch design, and concrete bridges are slab, arch, or T-beam structures. The remaining 10% of the bridges are chiefly steel-truss, girder, beam, or arch types with span lengths up to 450 feet; few timber bridges exist on the network. Horizontal clearances range from 8 to 50 feet; most bridges, however, can accommodate two-lane traffic. Vertical clearances are usually unlimited because most structures are deck types. However, some through-truss and tied-arch structures have minimum vertical clearances of 18 feet. Bridges are generally in fair to good condition. Load capacities of bridges, excluding timber structures, range from 15 to 50 tons. The capacity of timber bridges is probably less than 7 tons. There are at least 20 tunnels (Figure 4), eight underpasses, four snowsheds, and one ferry on the

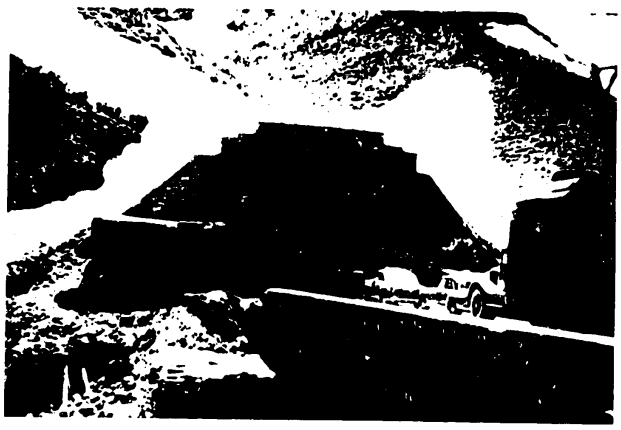


FIGURE 4. Entrance to tunnel on road to Caspian Sea from Tehran (U/OU)

highway network. Fords are numerous on secondary and local roads. The longest bridge in the country is the 2,021-foot structure over the Rud-e Karun at Khorramshahr.

Responsibility for highway construction and maintenance is vested in the Ministry of Roads and Communications and the Plan and Budget (formerly the Plan Organization). Construction is usually performed by Iranian contractors; however, foreign contractors have the opportunity to submit bids. The Ministry of Roads and Communications is responsible for all maintenance as well as for construction of roads.

Major construction problems are attributable to terrain and climate. Construction is difficult and costly in the rugged mountainous terrain, requiring extensive grading and the construction of retaining walls, tunnels, snowsheds, culverts, and bridges. During the rainy season and after spring thaws, flooding, landslides, and washouts cause damage which may require extensive maintenance and reconstruction. In the desert areas, construction is adversely affected by high temperatures, water shortages, sand drifts, salt marshes, and dust conditions.

Suitable construction materials such as sand, gravel, stone, and timber are generally available. Bituminous materials and cement are produced domestically and are in adequate supply. However, structural steel, construction equipment, and some spare parts must be imported.

Under the Fourth Development Plan (1968-73), the equivalent of about US$676 million was allocated for the construction of 2,919 miles of new bituminous-surfaced highways; for realigning, widening, and resurfacing of 2,795 miles of existing roads; and for the construction of 8,762 miles of rural or feeder roads. Emphasis has been given to upgrading main roads and improving feeder roads which are urgently needed to develop mining and agricultural areas. Included in this program was the bituminous surfacing of the roads from Shiraz to Bushehr via Kazerun; Yazd to Baghin; Shah Pasand to Bojnurd; and Quchan to Mashhad. Highways affording through movements to Turkey and Pakistan are being resurfaced with bitumen under the auspices of CENTO.

Highway movement is restricted by physical bottlenecks and climatic factors. In the difficult mountainous terrain of western and northwestern Iran, there are many sharp curves, steep grades, and defiles. Other bottlenecks consist of ferries, fords, tunnels, underpasses, snowsheds, and unbridged wadies. In addition, there are some narrow bridges with restricted vertical clearances and numerous unsurfaced roads with low supporting characteristics. Precipitation is generally light in most parts of the country; however, rainfall affects unsurfaced roads and occasionally causes inundations and washouts. Snow and fog, especially in the north and northwestern mountainous regions, occasionally interrupt traffic movement. In the desert areas of central and eastern Iran, high temperatures, sandrifts, and duststorms affect traffic movement. Occasional earthquakes, especially in the northwest, destroy road sections and bridges and cause landslides.

FIGURE 5. Characteristics of selected highways (C)

ORIGIN AND DESTINATION	DISTANCE	SURFACE TYPE	SURFACE WIDTH	SHOULDER WIDTH	CONDITION	REMARKS
	(*Miles*)		(*Feet*)	(*Feet*)		
Tehran–Bushehr (via Esfahan)	755					Segments of route between mile 652 and 755 are being improved.
Tehran–Shiraz	678	Bituminous	20–30	3–6	Good	
Shiraz–Bushehr	77	Gravel	12–20	2	Fair	
Tehran–Abadan (via Khorramabad and Andimeshk).	728	Bituminous	22–30	3	Fair to good	
Turkish border–Tehran (via Tabriz)	539	Bituminous	22–30	6.5	Good	Route bypasses city of Khvoy. Some segments subject to snow blockage in mountainous areas from December through March.
Tehran–Afghanistan border (via Semnan and Mashhad).	721	Alternating stretches of bituminous and gravel.	20–30	2–6	Fair to good.	Segments of the last 121 miles being improved.
Qom–Bandar 'Abbas (via Kashan and Baghin).	995	Bituminous	21–30	3–4	Good	Sharp curves and steep grades and four tunnels.
Eshafan–Na'in	85	Bituminous	18–25	2–6	Fair to good.	
Kerman–Pakistan border	376	Gravel	...	...	Fair	Unbridged wadies subject to flooding.
Iraq border–Takestan (via Kermanshah)	416	Bituminous	18–26	2–4	Good	
Qazvin–U.S.S.R. border	269					The section from Qazvin to Astara has been realigned, shortened, and improved. Segments subject to snow blockage from December through March.
Qazvin–Bandar-e Pahlavi	164	Bituminous	26	4	Good	
Bandar-e Pahlavi–U.S.S.R. border	105	Bituminous and gravel	12–20	3	Fair to good	
Marand–U.S.S.R. border at Jolfa	42	Gravel	18–27	3	Fair	Subject to snow blockage from December through March.
Mashhad–U.S.S.R. border (via Quchan)	91	Gravel	12–25	2	Fair	Subject to snow blockage from January through March. Bituminous surfacing in progress between Mashhad and Quchan.
Tehran–Quchan	697	Bituminous and gravel	18–36	3–6	Fair to good.	Subject to snow blockage in winter and flooding throughout the year. Gravel portion of the route is from mile 492 to 627 and is 30 to 36 feet wide and in good condition.

... Not pertinent.

Because Tehran, the principal commercial and urban center, is located a considerable distance from the Persian Gulf ports, large volumes of goods are transported by truck on the main north-south routes. A large volume of traffic is also generated in western Iran on routes serving cities, petroleum refineries, and agricultural regions.

Truck transport in Iran is performed by private companies. The vast majority of trucking companies operate with less than three vehicles and hire out to larger firms on a contract basis. Most trucking firms are members of the trucking syndicate, headquartered in Khorramshahr, which serves as a pool and maintains tariff structures agreeable to truck owners and shippers. Rail transportation is used less widely than truck transportation because of the more advantageous rates for less than carload quantities offered by the trucking firms. Highway transport produces about 4 billion cargo ton-miles and 1.7 billion passenger-miles per year. Principal exports carried to the ports are carpets, cotton, fruit, hides, and mineral ores; imports consist mainly of machinery, iron and steel, transport equipment, and consumer goods.

In January 1971, there were about 365,000 motor vehicles registered in Iran, consisting of 272,000 passenger cars and 93,000 trucks and buses. In addition, NOIC owns and operates about 750 passenger cars, buses, and various types of trucks. Since 1970, indigenously produced motor vehicles have accounted for virtually all of the new registrations. Although the motor vehicle industry currently relies heavily on imported components and subassemblies, local manufacture of these items is being expanded. The United Kingdom is presently the primary source of vehicle components.

Characteristics of the most important highways are listed in Figure 5.

D. Inland waterways (C)

Inland waterway transport is a minor factor in the economy of the country. Excluding the Caspian Sea and 64.6 miles of the important Shatt al Arab, which lies almost wholly within the territorial jurisdiction of neighboring Iraq, there are 565 miles of navigable waterways within Iran. Water transport consists principally of moving equipment, supplies, and personnel in support of the petroleum industry, and local transport of POL, building materials, fish, grain, and foodstuffs. On the two most active waterways, the Rud-e Karun and Lake Urmia, annual tonnage movement amounts to 150,000 and 20,000 short tons, respectively. Navigation on the Shatt al Arab is primarily maritime. Iranian participation in Caspian Sea traffic is negligible; most cargo is handled by Soviet vessels. At Bandar-e Pahlavi, the most important Iranian Caspian port, about 250,000 short tons of cargo are handled annually. Except for Shatt al Arab, the Rud-e Karun, Lake Urmia, and the Caspian Sea, waterways consist mostly of a few minor streams emptying into either the Persian Gulf or Caspian Sea; almost all of these streams are navigable for distances of less than 20 miles. The waterways are adequate for normal requirements.

The navigable part of the Rud-e Karun begins at Khorramshahr, where the 2.3-mile Hafar Channel provides access to the maritime Shatt al Arab. Large, sidewheel steamers with tows of one or two barges ascend the river regularly during high water (December to May) to Ahvaz, 113 miles north of Khorramshahr. The barges, restricted to 5-foot drafts, have capacities up to 300 tons. The safe draft during low water may be as little as 1.5 feet. Rapids near Ahvaz permit passage of empty craft only; all cargo must be transshipped. Small 150-ton craft with 2-foot drafts can reach Shalili-ye Bala, 79 miles north of Ahvaz; however, shipping on this section is insignificant.

The Caspian Sea borders Iranian territory for about 400 miles. Small, coastal-type steamers of 1,000-ton capacity normally are the largest craft operating from Iranian Caspian Sea ports. However, a few 4,500-ton Soviet vessels occasionally depart from Bandar-e Pahlavi for the Baltic Sea ports via the Volga network.

Lake Urmia, about 2,000 square miles in area, provides a major means of local transport in northwestern Iran, a highly productive agricultural area. Depths generally range from 16 to 50 feet, but are much less in the port areas and near shore. The Iranian State Railways maintains 170 route miles of passenger and shipping service on the lake.

The greatest deterrent to navigation is the excessive silting during high water. The rapids on the Rud-e Karun and the sandbars at the mouths of the few streams emptying into the Persian Gulf and Caspian Sea also are serious handicaps to commercial craft. On the Caspian Sea and Lake Urmia, silting and diminishing water levels have limited accessibility at most ports to small vessels. At Bandar-e Pahlavi, northerly winds hamper harbor entry; high winds may develop at any time and hinder shipping on Lake Urmia. Drift ice in the southern parts of the Caspian Sea is particularly hazardous to navigation during winter. Dredged channels are maintained in the maritime reaches of the Shatt al Arab, sections of the

Rud-e Karun, and to a lesser extent in the ports of Lake Urmia and the Caspian Sea. Of the eight bridges over Iranian waterways, only one, over the Khowr-e-Bahmanshir near Abadan, has insufficient clearance to permit through navigation.

Inland waterway ports have very limited facilities and are generally in poor condition. Ahvaz on the Rud-e Karun is a transshipment point for supplies and equipment moving from Khorramshahr to oilfields in the interior; downstream shipments include quarried stone and aggregate. The 150,000 tons of cargo moved annually are handled along 1,160 feet of quayage equipped with at least two 15-ton and one 7-ton cranes. Rail and road clearance is provided.

The most active ports on Lake Urmia are Sharafkhaneh, a rail transshipment point on the northeastern shore; Rahmanlu, a passenger handling port on the southeastern shore; Golmankhaneh, the port for the western province on the western shore; Danalu and Heydarabad, smaller ports on the southern and eastern shores, respectively. Landing facilities at each of these consist of a single pier; lengths range from 490 to 1,130 feet with alongside depths at pierhead of 7 to 11 feet. Inshore depths decrease sharply. No mechanical handling facilities are available to transfer cargoes which include foodstuffs and construction materials.

Activities at Bandar-e Pahlavi, Now Shahr, and Bandar-e Shah, the principal Caspian Sea ports, are centered around the fishing industry. Occasionally, Soviet cargo vessels call at Bandar-e Pahlavi, the most important of the three, and less frequently at Now Shahr. Vessels of up to 4,500 tons and 14-foot draft can use Bandar-e Pahlavi's 1,700-foot commercial quay, which is equipped with four 25- to 30-ton capacity cranes. Covered storage facilities total 206,800 square feet. Heavy silting in the harbor requires constant dredging. Now Shahr, which handles about 35,000 tons of cargo yearly, is heavily silted between its two breakwaters, but a 13-foot dredged channel allows the use of the 700-foot East Quay by 3,000-ton ships. At least one 10-ton and one 12-ton cranes are in use, and 15,000 square feet of covered storage are available. Bandar-e Shah wharf facilities have been deteriorating for several years. Silting has reduced the safe draft to 4 feet, and only small fishing vessels now use the harbor.

Most of the inland waterway fleet is old and in need of replacement. Craft in use on the Shatt al Arab and Rud-e Karun are operated principally by the National Iranian Oil Company (NIOC) and are adequate for cargo operations. NIOC craft include at least 31 tugs ranging from 180 to 1,000 horsepower, one self-propelled and 108 dumb barges ranging in carrying capacities from 50 to 400 tons, seven bulk POL barges, 74 launches, and nine miscellaneous craft including two steam-driven stern-wheelers. On Lake Urmia three tugs ranging from 75 to 220 horsepower, eight dumb barges with capacities ranging from 100 to 200 tons, and one ferry (100-passenger capacity) are in operation. At least 10 Iranian vessels (one cargo steamer, three dumb barges, four tugs of up to 600 horsepower, and two launches) operate on the Caspian Sea. In addition, an undetermined number of native craft, some of up to 80-ton capacity, operate on the waterways.

Control of inland waterways and port facilities is exercised chiefly by the Ministry of Roads and Communications through the Bureau of Ports and Navigation and the Iranian State Railways. The NIOC controls and regulates shipping on the Rud-e Karun, but the government is responsible for dredging and port maintenance. Navigation on the Shatt al Arab, except in the harbor areas of Khorramshahr and Abadan, is under the general jurisdiction of the Basra, Iraq Port Directorate.

E. Pipelines (C)

Pipelines are the most important means of transporting crude oil and refined products in Iran. Nearly 75% of all crude oil and products are transported by pipelines. About 3,300 route miles of major crude oil pipelines are on streata, under construction, or planned. In addition, a 1,050-mile-long 42-inch pipeline extending to an export terminal at Iskenderun, Turkey has been proposed. Iran also has about 2,785 miles of refined products pipelines and 1,760 miles of natural gas pipelines (includes 115 miles of gathering lines) in operation, under construction, or planned. All lines are owned by the government through the National Iranian Oil Company (NIOC), which operates more than half the total length of line. The remainder are operated largely by the Iranian Oil Exploration and Producing Company, but two other companies operate some of the shorter pipeline facilities.

NIOC operates a crude oil pipeline system from the Naft-e Shah oilfield to the Kermanshah refinery, and also a 467-mile 16- to 20-inch crude pipeline system from Ahvaz oilfield to the Rey (Tehran) refinery.

Crude oil lines operated by the Iranian Oil Exploration and Producing Company comprise the largest crude oil pipeline complex. The company's lines are mainly concentrated in southwestern Iran, where they form a northern and southern system

FIGURE 6. Selected pipeline systems (C)

SYSTEM			NUMBER OF			
From	To	LENGTH	LINES	DIAMETER	CAPACITY	REMARKS
		Miles		*Inches*	*B.p.d. (oil) C.f.d. (gas)**	
Crude oil:						
NIOC System						
Naft-e Shah oilfield	Kermanshah refinery	146	1	6	*na*	Kermanshah refinery with a capacity of 15,000 b.p.d. went into operation in 1971.
Do	*do*	150	1	8	*na*	Under construction.
Naft-e Shah topping plant	*do*	146	1	3	5,700	Transports topped crude oil.
Ahvaz oilfield	Rey (Tehran) refinery	167	1	16 20	91,000	Known as the "Second Trans-Iranian Pipeline." Route generally parallel to the Trans-Iranian Pipeline, for refined products. Capacity will be increased to 116,000 b.p.d.
Ahvaz oilfield	*do*	167	1	26 30	140,000	Under construction. Completion set for August 1973.
Alborz oilfield	*do*	85	1	*na*	*na*	Planned.
Gachsaran oilfield	Shiraz	145	1	10	*na*	To supply Shiraz refinery. Refinery under construction, will be completed late 1973. Planned capacity of refinery is 40,000 b p.d.
Abadan Refinery Supply System						
Lali oilfield	Masjed Soleyman oilfield (Tembi)	39	1	8 12	40,000 to 50,000	Pumping station at Lali and Tembi.
Masjed Soleyman oilfield	Kut 'Abdollah pump station	69	1	10	228,000	Parallel lines. Has 7 major manifold systems and pipeline junctions with eight 12-inch feeder lines.
			3	12		
Haft Gel oilfield, No. 1 Unit	Veys	11	2	12	83,000	Parallel lines connecting with Masjed Soleyman Kut 'Abdollah line at Veys. Also serves Naft-e Safid oilfield.
Do	Kut 'Abdollah manifold	53	2	12	83,000	Parallel lines. Also serve Rud-e Martin and Ahvaz oilfield production units.
Kut 'Abdollah pump station	Abadan refinery	66	2	10	156,000	Parallel lines with 2 manifolds en route.
			1	12		
Bandar-e Mah Shahr Kharg Island Export System						
Abu ol Fares	Agha Jari flow tank	20	1	12	*na*	
Agha Jari flow tank	Mile 19 manifold	18	1	22	190,000	Other feeder pipelines from Agha Jari oilfield to Manifold 19 have combined length of 53 miles 12 to 24 inches in diameter.
Mile 19 manifold	Bandar-e Mah Shahr manifold	21	3	12	900,000	Production from Agha Jari and nearby fields is being
			1	20	(est.)	diverted to Jazireh-ye Khark (Kharg Island).
			2	20 22		These lines may be used for other purposes.
Bandar-e Mah Shahr manifold	Bandar-e Mah Shahr tank farms	5	1	6	*na*	Two 5-mile lines to back area tank farm and 4-mile line continues to foreshore tank farm.
		5	1	16	*na*	
		1	1	16	*na*	

Footnotes at end of table.

FIGURE 6. Selected pipeline systems (C) (*Continued*)

SYSTEM		LENGTH	NUMBER OF LINES	DIAMETER	CAPACITY	REMARKS
From	To					
		Miles		*Inches*	*B.p.d. (oil) C.f.d. (gas)**	
Crude oil (*Continued*):						
Bandar-e Mah Shahr/Kharg Island Export System (*Continued*):						
Agha Jari oilfield	Gorreh manifold	106	1	42	1,500,000	
Gachsaran oilfield	*do*	36	1	26	750,000	Lines converge about 7 miles west of oilfield and then run parallel.
		41	1	26–28		
Bibi Hakimeh oilfield	*do*	17	1	8–10	250,000	Lines are parallel.
			1	26–28	(*est.*)	
Gorreh manifold and pumping station.	Ganaveh manifold	23	1	42	2,500,000	*Do.*
			1	30		
			1	26–30		
Ganaveh manifold	Jazireh-ye Khark (Kharg Island)	27	4	30	3,883,000	Parallel submarine pipelines. Tank farm on Kharg Island has storage capacity for 14 million bbl.
			1	42		
Bang (Binak) oilfield	*do*	27	2	42–56	*na*	Submarine pipelines.
Offshore Oilfield Export Systems						
Bahrgan Sar	Emam Hasan	33	1	16	24,000	*Do.*
		5	1	18		
Hendijan oilfield	Bahrgan Sar	10	1	*na*	22,000	Uses Bahrgan Sar submarine pipeline for transmission to shore.
Now Ruz oilfield	Emam Hasan	58	1	36	32,000	Submarine pipeline from offshore field.
Sasan oilfield	Jazireh-ye Lavan	88	1	22	200,000	*Do.*
Rostam oilfield	*do*	68	1	18	37,000	*Do.*
Rakhsh oilfield	Rostam oilfield	19	1	*na*	34,000	Under construction.
Iranian Oil Exploration and Producing Company						
Ahvaz	Ganaveh manifold	154	1	42–48	*na*	Under construction; will connect with submarine pipelines to Kharg Island. Completion set for late 1972.
Refined Products:						
Trans-Iranian and NIOC Systems						
Abadan refinery	Ahvaz	66	1	4	*na*	Trans-Iranian System transports gasoline, kerosene, and diesel fuel.
			1	6	20,000	
			1	8	*na*	
			1	12	48,000	
Ahvaz	Rey (Tehran) refinery and distribution center.	511	1	10	40,000	Trans-Iranian System generally parallel to crude line except in difficult terrain. About 44 miles longer than the crude oil line.

Rey (Tehran) refinery and distribution center.	Rasht via Qazvin	220	1	6–8	20,000	Trans-Iranian System.
Do.	Tabriz	396	1	10	20,000	Planned by NIOC to serve industry in the Azerbaijan-e Sharqi region. Storage for 290,000 bbl. planned for Tabriz receiving area.
Do.	Mashhad	510	1	8	14,000	Trans-Iranian System. Line capacity to be increased to 25,600 b.p.d.
Ezna junction	Esfahan	148	1	6	6,000	Trans-Iranian System. Connects with Ahvaz-Rey line.
Naft-e Shah topping plant	Kermanshah refinery	146	1	3–4	5,700	Transports light ends from topping plant. NIOC.
Shahrud	Gorgan	183	1	6–8	*na*	Trunk line of Trans-Iranian System; under construction.
Iranian Oil Exploration and Producing Company						
Masjed Soleyman oilfield topping plant.	Ahvaz	62	1	10	*na*	Transports residual and distillate fuel oil.
Abadan refinery	Bandar-e Mah Shahr	66	3	12	*na*	One 12-inch line extends from Marad manifold to Bandar-e Mah Shahr. The 26-inch line carries heated bunker fuel to Bandar-e Shahpur, the primary refined products exporting terminal for Abadan refinery.
		66	1	26	*na*	
Natural Gas:						
NIOC Lines						
Agha Jari oilfield	Astara	687	1	40–42	1,650,000	Iranian Gas Trunkline (IGAT). Fed by 115 miles of varied size gathering lines in oilfield. Four main-line compressor stations; to be increased to eight. Ultimate capacity is 1.05 billion c.f.d. to U.S.S.R. and 0.6 billion for domestic use. Export rate reached 782.6 million c.f.d. in 1971. IGAT system includes about 220 miles of spur lines; additional 200 miles under construction.
Sarajeh gasfield	Tehran	88	1	20	16,250	Part of IGAT system. Serves industrial consumers.
Pipeline junction	Kashan	44	1	6	*na*	Spur line from IGAT system.
Do.	Tehran	70	1	30	*na*	*Do.*
Do.	Esfahan	63	1	4–16	5,000 (*est.*)	Spur line from IGAT system. Serves steel mill.
Do.	Qom	42	1	6	*na*	Spur line from IGAT system.
Bid Boland gas refinery	Shiraz	202	1	8–16	*na*	Under construction; spur line from IGAT system.
Gachsaran oilfield	....*do.*	142	1	10	26,500 (*est.*)	Industrial and domestic consumption.
Masjed Soleyman	Bandar-e Shahpur	120	1	20	*na*	Under construction; to supply petrochemical complex at Bandar-e Shahpur.
Iranian Oil Exploration and Producing Company						
Agha Jari oilfield	Abadan	110	1	12	*na*	
Do.	Ahvaz	75	1	36	2,260 (*est.*)	

na Data not available.
*Capacity for natural gas is given in 1,000 standard cubic feet per day.

serving the prolific oilfields of the area. The northern system supplies crude oil to the Abadan refinery, and the southern system serves export terminals at Bandar-e Shahpur and Jazireh-ye Khark (Kharg Island).

The proposed 1,050-mile 42-inch pipeline to the Mediterranean via Turkey, is intended mainly to compete for Libyan and other Arab crude oil markets in the area. It would probably originate in the Ahvaz area, extend northwestward across the Turkish border, then westward to Iskenderun. The line would ultimately carry about 1.4 million barrels per day. This proposed project has considerable economic and political obstacles to overcome, and as a consequence, very little progress has been achieved over the past 3 years.

Underwater areas of the Persian Gulf have also been tapped by pipelines. Irano-Italian Petroleum Company operates a 33-mile 16-inch line from its offshore Behrgan Sar oilfield in the Persian Gulf to Emam Hasan onshore. An 18-inch line extends 3 miles offshore to a tanker loading berth.

In 1968 the Lavan Petroleum Company completed an 88-mile 22-inch crude oil pipeline from the offshore Sasan oilfield to Jazireh-ye Lavan (Lavan Island). In places, the submarine line lies in water 300 feet deep. Other offshore fields served by submarine pipelines include Now Ruz, Rostam, Rakhsh, and Hendijan.

Iranian Oil Exploration and Producing Company operates a light-products line from the Masjed Soleyman topping plant to the Abadan refinery, and several lines from the Abadan refinery to the Bandar-e Mah Shahr terminal.

NIOC operates the 1,700-mile Trans-Iranian Pipeline System for refined products. The system was constructed to transport gasoline, kerosene, and distillate fuel oil from Abadan to the large consuming areas in the north, primarily near Tehran. Extensions of the system include lines from Tehran northwestward to Rasht and eastward to Mashhad. There are facilities for loading road tankers at several locations along the line. NIOC also operates a small (3 to 4 inch) product line from Naft-e Shah oilfield to Kermanshah refinery.

Exploitation of Iran's natural gas resources is rapidly increasing in importance. Iranian Oil Exploration and Producing Company operates natural gas lines in southwest Iran, which supply a powerplant at Tembi and the Abadan refinery. NIOC, through its subsidiary the National Iranian Gas Company, operates a 142-mile 10-inch natural gas pipeline from Gachsaran to Shiraz and a 70-mile 30-inch natural gas pipeline from Sarajeh gasfield to Tehran. In addition, NIOC has completed the 687-mile 40- to 42-inch Iranian Gas Trunkline from Agha Jari and Gachsaran fields to Astara, U.S.S.R.; spur lines totaling about 220 miles, lead to Esfahan, Kashan, Qom, and Tehran. A spur line from Bid Boland gas refinery to Shiraz and a gas pipeline from Masjed Soleyman to Bandar-e Shahpur are under construction.

Details of selected pipelines systems are given in Figure 6.

F. Ports (C)

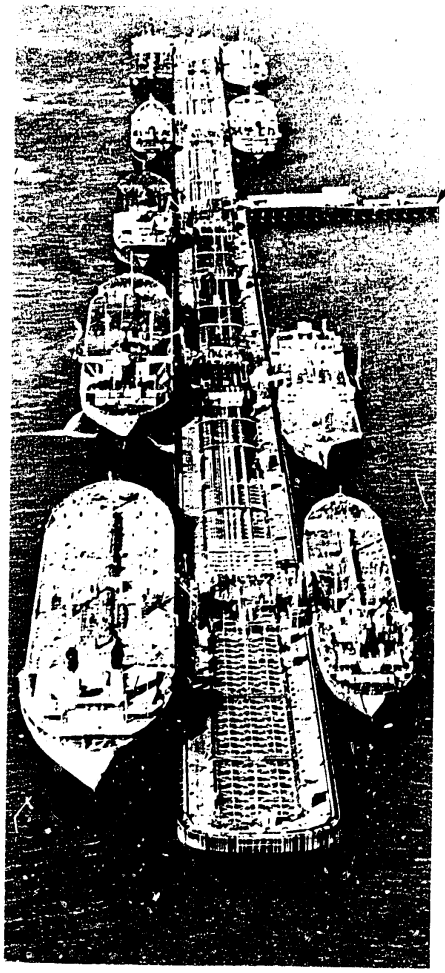
Iran has seven major and six minor ports. The major ports are Abadan, Bandar-e Shahpur, Khorramshahr, Bandar 'Abbas, Bandar-e Mah Shahr, Bushehr, and Kharg Island. With the exception of Bandar 'Abbas, all of the major ports are located near the head of the Persian Gulf. Bandar 'Abbas is situated in the Strait of Hormuz. The minor ports include Asaluyeh, Bandar-e Lengeh, Chah Bahar, Ganaveh, Hormoz, and Jask. These are scattered along the coast from the head of the gulf to the Pakistan border.

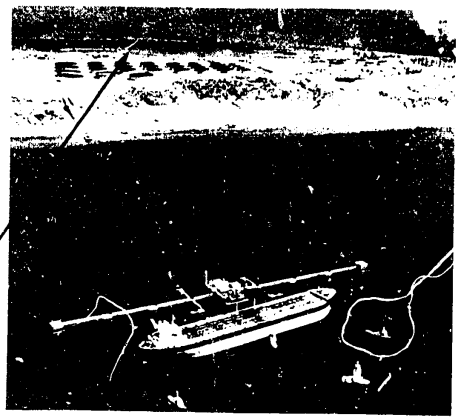
The major ports are divided into two functional categories, petroleum ports and general-cargo ports. Abadan, Bandar-e Mah Shahr, and Kharg Island are petroleum ports, developed and maintained in excellent condition by the petroleum industry. Their chief functions are to receive imported material and equipment required by the petroleum industry and to export crude and refined products. Abadan is the center of operations of the National Iranian Oil Company. Under agreement with the government, a consortium of U.S., U.K., Netherlands, and French oil companies operate the Abadan refinery, the second largest in the Middle East.

In October 1972, the country inaugurated a mammoth oil-loading terminal (Figure 7) on the west coast of Kharg Island. Designed for the new generation of giant tankers, the offshore twin-berth terminal is capable of doubling Iran's oil exporting capacity. One berth is designed for 500,000-deadweight ton tankers and the other for 300,000-ton vessels. From the shore to the offshore berth, crude oil moves through two 56-inch submarine lines, the world's largest. Eight loading arms can deliver the crude at 225,000 barrels an hour. The tank farm, totaling 14 million barrels, includes five of the biggest floating roof tanks in the world.

Khorramshahr, Bandar-e Shahpur, Bandar 'Abbas, and Bushehr are general-cargo ports; Khorramshahr (Figure 8) is the most important. Bandar-e Shahpur provides storage space for cargo in transit to Afghanistan, and the amount of cargo handled at the port has steadily increased during the past decade. The port functions almost entirely as an import center;

The largest oil-loading pier in the world (6,000 feet long), located on island's east coast, serves tankers up to 250,000 d.w.t. at 10 berths.





New offshore twin-loading oil berth, located on island's west coast, serves tankers up to 500,000 d.w.t. Crude is delivered by two 56-inch submarine pipelines, the world's largest.

FIGURE 7. Jazireh-ye Khark (Kharg Island), the oil industry's biggest marine loading terminal, handles millions of barrels of Iranian crude oil at elaborate supertanker facilities. (U OU)

there is no local industry. Bandar 'Abbas is a new deepwater port designed primarily to serve the developing industries and is also a naval base. Operations at Bushehr are hampered by inadequate facilities.

With the exception of the island port of Hormoz, all of the minor ports are coastal ports; two are located on the Gulf of Oman and three on the Persian Gulf. Utilization for foreign trade is greatly impeded by meager facilities, limited cargo-handling capabilities, and inadequate rail and road clearance.

Abadan, Bandar-e Mah Shahr, and Kharg Island are administered and operated by the oil consortium within the scope of its overall operations. Administra-

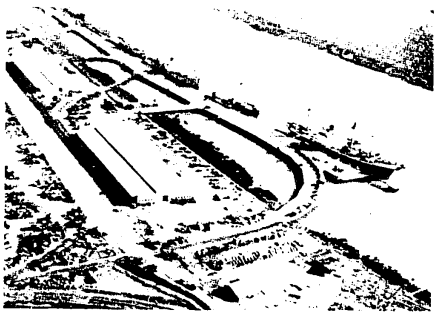


FIGURE 8. River port of Khorramshahr situated on the Shatt al Arab. During WWII, Khorramshahr was the main port of entry for cargoes under Lend-Lease Aid to the U.S.S.R. (U OU)

FIGURE 9. Major ports (C)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Abadan 30°20′N., 48°16′E. 5,250	Site of one of the world's largest refineries; has limited significance as a general-cargo port; main function is shipment of POL, receipt of equipment and supplies for city and refinery; small repair yard handles mostly barges and motor launches; largest floating drydock has 2,500-long ton lifting capacity.	Well-sheltered river harbor occupying a 4-mile section of Shatt al Arab fronting town and 3 basins; total water area, some 2 square miles; central depths range from 30 to 39 ft.; approach channel has a 27-ft. controlling depth (35 ft. MLHW) and 300-ft. width; maintained by continuous dredging.	Alongside: 2 ocean-type and 2 coaster-type cargo vessels, 33 lighters, 12 ocean-type and 1 coaster-type tankers, and 2 tanker barges. Fixed Mooring: 7 ocean-type cargo vessels. Anchorage: 6 coaster-type cargo vessels.
Bandar 'Abbas 27°08′N., 56°12′E. 5,100	Deepwater port serving mining industries of the country. It is potentially the country's major port in the south and a leading commercial center in the Persian Gulf; it is primarily an exporting port, the principal exports are manganese and chromite followed by crude oil; principal imports are construction materials, tea, flour, and general cargo; small naval base when completely developed will be the navy's major base. Naval repair ship and floating drydock, 3,000-ton lifting capacity. A repair shipyard, with 2 drydocks and 6 berths, is projected.	Artificial breakwater-protected harbor consisting of a turning basin, a commercial basin, and a naval basin totaling about 140 acres of water area and depths of 34 ft. (MLHW); controlling depth in entrance is 29½ ft.; maintained by dredging.	Alongside: 7 ocean-type cargo vessels, 1 ocean-type tanker, and 2 medium-type naval vessels. Anchorage: Large numbers of standard berths of all classes southeastward of harbor in depths ranging from 24 to 60 ft. over good holding ground; protected except from southeastward.
Bandar-e Mah Shahr 30°33′N., 49°12′E. 330	Large refined products port; NIOC's pipeline terminal for oilfields in southwest Iran; cargo operations confined exclusively to shipments of refined products from Abadan refinery.	Adequately protected river harbor occupying a 6-mile stretch of Khowr-e Ma'shur which is 1,000 to 1,800 ft. wide; general depths range from 18 to 72 ft.; controlling depth is 31½ ft. (40 ft. at MLHW) over a width of 600 ft. at bar 34 miles south of Bandar-e Shahpur.	Alongside: 6 ocean-type tankers and 1 lighters. Anchorage: 1 large and 16 medium ocean-type tankers.
Bandar-e Shahpur 30°20′N., 49°05′E. 4,000	One of 2 southern port terminals of Iran State Railways; second-ranking general-cargo port; receipts consist mainly of construction materials and government-consigned cargoes.	Fairly well-protected river harbor consisting of a 4-mile stretch of Khowr-e Musa with average width ¼ mile; central depths range from 50 to 120 ft.; controlling depth is 31½ ft. (40 ft. MLHW) over a width of 600 ft. at bar 34 miles south of port.	Alongside: 7 ocean-type cargo vessels. Anchorage: 1 large passenger ship and 6 ocean-type cargo vessels.

Bushehr 28°59′N., 50°50′E. 1,900	Distribution center of POL products for Bushehr coastal plain; serves as one of the importing and distribution centers for the Fars region and as the principal commercial and trading center for the area; minor naval shore facility; small civilian shipyard repairs small naval craft, barges, and small merchant vessels; one prototype ferro concrete-hull fast patrol boat now under construction and due for completion in late 1973; syncrolift has a 1,000-ton lifting capacity. Naval facility is to be developed into a minesweeping and hovercraft base.	Small, well-sheltered harbor on Khowr-e Soltani; general depths range from 15 to 42 ft.; a width of about 1,500 ft.; controlling depth is 17 ft. (21 ft. MHLW) over bar.	Alongside: 3 small ocean-type cargo vessels, 1 small coaster-type tanker, and 3 medium size naval vessels. Anchorage: Large numbers of class III berths in roadstead in depths of 24 ft. over good holding ground; protected except from northwest; untenable in bad weather.
Jazireh-ye Khark (Kharg Island). 29°15′N., 50°20′E. 1,200	One of the world's largest crude oil terminals; can handle tankers of up to 500,000 d.w.t. at new supertanker-loading island 4,800 ft. off shore; terminus of crude oil pipeline from Gachsaran oilfield; a small naval base accommodates several minesweepers and 200 persons; minor repair facilities available for small craft; a hovercraft and helicopter base is now operational.	Improved natural, adequately protected harbor comprising an open roadstead and 2 basins; depth in basins is 20 ft., maintained by dredging; depth at crude oil loading pier, on east side of island, is 65 ft.; depth at offshore-tanker berth, on west side of island, averages about 105 ft.	Alongside: 2 supertankers, 11 large ocean-type tankers, 3 standard and 4 small coaster-type vessels, 2 small naval vessels, and 1 PT boat. Fixed Mooring: Several lighters. Anchorage: Large numbers of vessels of all sizes.
Khorramshahr 30°25′N., 48°11′E. 8,900	Iran's most important maritime center; handles about 65% of imported dry cargo, including iron, steel, machinery, cement, wheat; principal exports are wood, cotton, minerals, raisins; frequently functions as transshipment port; industry negligible except for shipping; it is the site of the Persian Gulf Fleet Headquarters; small repair yard at naval base effects drydocking repairs to small naval vessels at a 100-ton lifting capacity floating drydock; uses the 3,000-ton lifting capacity floating drydock from Abadan for repairs to larger naval ships; largest drydocking facility, floating drydock with 100-ton lifting capacity; naval operating base has landing, shipyard, supply, communications, training, and medical facilities.	Well-protected river harbor consisting of 3-mile section of Rud-e Karun (old harbor) and 5½ mile deepwater section of Shatt al Arab; width, 500 to 1,200 ft.; total water area, 2½ sq. miles; general depths range from 18 to 90 ft.; normal controlling depth of approach channel over Karun Bar, immediately south of harbor, 21 ft. (26 ft. MLHW), maintained by dredging.	Alongside: 9 ocean-type and 4 coaster-type cargo vessels, 15 lighters, and 3 PT boats. Fixed Mooring: 3 medium-size ocean-type cargo vessels, 2 small-size ocean-type cargo vessels, and 1 coaster-type cargo vessels. Anchorage: 5 ocean-type cargo vessels in Shatt al Arab south of the port.

*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 working hours). The 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 for operational purposes; it cannot be projected beyond a single day by straight multiplication.

tive and operational control of Bandar 'Abbas, Bandar-e Shahpur, Bushehr, and Khorramshahr is exercised by three government agencies: the Department of Customs, the Department of Ports and Navigation, and the Iran State Railways. The Department of Customs is in charge of the receipt and handling of cargo, including storage and security, and directs port traffic in general. The berthing of ships, maintenance of port facilities and navigational aids, and piloting are the primary responsibility of the Department of Ports and Navigation. The Iran State Railways furnishes rolling stock, switch engines, and mobile cranes for handling cargo within the port. This equipment, which is rented to the Department of Customs, is operated by railroad personnel.

Details of the major ports are given in Figure 9.

G. Merchant marine (C)

Iran is dependent upon sea transport both for the carriage of its crude oil exports, which are expected to earn for the government about US$2.7 billion during the Iranian fiscal year 1972/73, and for the transport of virtually all consumer product imports. The Iranian merchant fleet, however, carries only a small portion of this trade.

In July 1972, the country's merchant fleet consisted of 15 ships of 1,000 gross register tons (g.r.t.) and over, totaling 130,339 g.r.t. or 219,075 deadweight tons (d.w.t.), as follows:

Type	Number	G.R.T.	D.W.T.
Dry cargo	11	97,480	130,927
Tanker	4	52,859	88,148

The fleet is small but fairly modern. Six dry cargo ships are less than 5 years old; three tankers and four dry cargo ships are between 11 and 18 years old; and one tanker and one dry cargo ship are more than 20 years old. Four ships are less than 10,000 d.w.t. and nine ships are between 10,000 and 17,000 d.w.t. The largest units are two 35,000-d.w.t. tankers. Thirteen ships are diesel powered, and two (tankers) have oil-fired boilers. Six dry cargo ships have service speeds of more than 19 knots; the remaining ships have speeds of 11 to 17 knots. All units were built in foreign shipyards. Iran has no capability for construction of oceangoing merchant ships. Two Japanese tankers, at 235,000 d.w.t. each, were on order in late 1972.

Ownership of the merchant fleet is divided among six government and private beneficial owners (entities which assume profit or loss from operations). The two largest owners (83% of total fleet deadweight tonnage) are the joint government-private enterprise, Arya National Shipping Lines (ANSL), with eight dry cargo ships of 110,912 d.w.t. and Iran Destiny Carriers, Inc., with two tankers of 69,898 d.w.t. that are operated by the National Iranian Tanker Company, Rotterdam.

Iran Destiny Carriers, Inc., is also the beneficial owner of five tankers totaling about 216,000 d.w.t. that are registered under Liberian flag.

The dry cargo ships operate primarily in scheduled (liner) services between Iran and ports in the Persian Gulf, Red Sea, Pakistan, India, Ceylon, Malaysia, Singapore, Hong Kong, Japan, Northern Europe, the Mediterranean, the east and west coasts of Africa, and east coast and gulf ports of the United States. ANSL is a member of the Persian Gulf/Northern Europe, Persian Gulf/Mediterranean, and Arabian and Persian Gulf-Japan Freight Conferences.

In addition to merchant ships of 1,000 g.r.t. and over, Iran has many smaller merchant ships, mostly sailing vessels, which operate in the Indian Ocean, Persian Gulf, and Caspian Sea. The fishing fleet consists of about 300 units, including 17 modern oceangoing fishing vessels between 100 and 499 g.r.t., totaling 2,025 g.r.t.

Maritime laws and regulations are administered by the Ministry of Economy. In order to qualify for Iranian-flag registration, a ship must be owned either by an Iranian national or by an Iranian corporation with registered Iranian shareholders owning more than 50% of the capital shares. Iran is a member of the Inter-Governmental Maritime Consultative Organization (IMCO) and a party to the Safety of Life at Sea, 1960, convention.

In 1968 when ANSL became the national shipping line, government policy stipulated that 50% of Iran's foreign trade would eventually be carried by this line. ANSL's fleet development has been significantly progressive. In 1968, the company began operations with five used dry cargo ships totaling 49,400 d.w.t. and by 1971 had disposed of three of these units and acquired six new dry cargo ships totaling 97,388 d.w.t.

The government provides no direct subsidies for ship operations or new construction. Indirect government assistance, however, was provided in the form of an interest-free loan, amounting to the equivalent of US$4 million, for the establishment of ANSL.

Of the seagoing personnel, few are Iranian citizens. Most of the ships' officers and ratings are British nationals. Although provisions of the Iranian Maritime Code of 1963 permit the employment of foreign nationals as officers and ratings, shipowners, at their expense, must train Iranians for replacement within 2 years for at least half of the billets. In 1970

the maritime academy was established at Bushehr for the training of 200 cadets annually for service in the merchant marine and the Department of Ports and Navigation.

II. Civil air (C)

Civil aviation in Iran is a significant factor in the country's economic development. Tehran is an important regional aviation center, and most international travel to Iran is by air. Air transport is of special significance in linking domestic points separated by long distances and isolated by mountainous terrain and inadequate surface communications. Although the improvement of civil air facilities receives high priority, domestic air services are still inadequate, and further expansion is necessary to provide scheduled flights to a number of cities and towns. During the Fourth Development Plan (1968-73), both domestic and international air routes were increased and air facilities upgraded.

Iran Air, with exclusive rights for scheduled passenger and freight operations, is the nation's only scheduled air carrier. The company is government owned and by law enjoys financial and administrative autonomy, and several key positions are staffed by the military. Iran Air has undertaken a thorough overhaul of its operations with technical and managerial assistance contracted from Pan American World Airways. The carrier has grown significantly since it was established in 1962 and has emerged as a profitable medium-sized airline. In the first 10 years of operation, the number of revenue passenger-miles flown has increased from 58.3 million to 432.5 million; the number of revenue ton-miles flown has increased from 6.4 million to 48.3 million; and the scheduled route network has increased from 9,600 to 29,700 miles. The airline flies to 17 domestic and 17 international points, including Moscow and six European cities. Iran and the United States have initialed an agreement under which Iran Air will fly jet passenger service to the United States. Domestic jet services were inaugurated in 1966.

The only additional air transport activities in the country are provided by the privately owned Air Taxi Company and several miscellaneous air service companies. The Air Taxi Company engages in mapping and crop dusting, regional charter flights, and domestic charter flights to towns lacking regular airline services, including most air transport within Iran for nonconsortium oil companies. The Iranian Oil Exploration and Producing Company operates three Fokker F-27-100's and several light aircraft and helicopters, all registered in the Netherlands, in connection with oil consortium operations. Helicopter Service Company and Helicopter Taxi Company provide aerial surveys, special services, and air-shuttle flights. The Ministry of Agriculture operates a fleet of light aircraft and helicopters for crop dusting.

About 140 civil aircraft are registered in Iran, including 28 helicopters. Of the total, 18 have a gross weight of 20,000 pounds or more. Iran Air's fleet consists of two Boeing 707-320C's, four Boeing 727-100's, three Boeing 737-200/200C's, and two Douglas DC-6B's. The remaining major transports are four Douglas DC-3's owned by Air Taxi Company, one Lockheed L-1329 registered to the Shah, one Hawker Siddeley HS-125-3B owned by the Iranian Oil Exploration and Producing Company, and one Dassault Falcon 20 owned by the Iranian Imperial Organization for Social Services.

About 5,500 persons are engaged in civil aviation activities. Iran Air employs 3,800, including 83 pilots, 40 flight engineers, and 800 maintenance technicians. The company staff is composed of about 90% Iranian nationals. Air Taxi Company's 180 personnel include 25 pilots.

Most civil aviation training in the country is conducted by Iran Air and the government-subsidized Civil Aviation Club. Iran Air is a prestige employer with a progressive recruitment and training program in which full-time courses are conducted in pilot, flight engineer, and maintenance training and airport services. In technical fields, domestic courses are usually supplemented by foreign training with an aircraft manufacturer or another airline. The Civil Aviation Club offers flight instruction leading to private and commercial licenses, and courses in gliding, airplane modeling, and parachute jumping. Formerly, most pilot training was conducted in the United States at the American Flyers School (Oklahoma) and at the Boeing training center. The U.N.-assisted Iranian Civil Aviation Training Organization offers courses in aircraft maintenance and commercial pilot training. A shortage of trained Iranians exists in pilot, administrative, sales, and other categories, which accounts for the continuing need for foreign pilots, engineers, and skilled maintenance technicians.

Iran Air and Iran Aircraft Industries, both located in Tehran, have the countries' most extensive maintenance facilities. Each organization is capable of complete overhaul of light aircraft and major maintenance on heavy transports. Airframe and engine overhaul work is contracted outside the country. Iran Air's jet engines have been maintained by Lufthansa (West Germany) and its DC-6 engines by Scandinavian Airlines System. Iran Air can overhaul some radio and navigation equipment, and jet engine hot section inspection facilities are being

established. Iran Aircraft Industries will have the capability to overhaul all types of aircraft and jet engines when its facilities are completed. The Air Taxi Company maintains its own and other companies' light aircraft, but its major overhauls are performed by Pakistan International Airlines.

Civil aviation is controlled by the Department of Civil Aviation (DCA), established under the Ministry of Roads and Communications, and headed by a director general. The DCA, which functions according to the Civil Aviation Act of 1949, is scheduled to prepare a new civil aviation code more responsive to current needs.

Iran maintains formal or informal air agreements with at least 34 countries. The country is served by 23 scheduled foreign airlines, including the carriers of Czechoslovakia and the U.S.S.R. Iran is a member of the International Civil Aviation Organization; Iran Air belongs to the International Air Transport Association and has pooling agreements with many foreign airlines.

I. Airfields[2] (C)

Iran has 148 airfields, four heliports, and 82 sites. Of the 148 airfields, four are military, eight joint military/civil, 10 civil, and 126 are minor airfields with limited facilities. Most of the major airfields are located in the more heavily populated west and northwest. Other important airfields, however, are Zahedan airfield in the southeast, Mashhad airfield in the northeast, Kerman and Yazd West airfields which are centrally located, and Bandar Abbas International airfield in the south.

[2]For detailed information on individual airfields in Iran see Volume 16, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency, Aerospace Center for the Defense Intelligence Agency.

The air facilities system of Iran provides adequate support for the country's military and civil requirements. Tehran/Mehrabad, Shiraz International, and Bandar Abbas International are the principal civil airfields and international airports of entry. Tehran/Mehrabad has two runways—one 13,123 feet long and the other 11,840 feet long—both capable of supporting C-141 aircraft. Shiraz International also has two runways—one 14,718 feet and the other 14,009 feet—both capable of supporting C-141 aircraft. Bandar Abbas International has a 12,007-foot runway which can also support C-141 aircraft. These three airfields are also used by the Imperial Iranian Air Force. The main military bases are Shahrokhi Air Base with a 14,625-foot asphalt runway capable of supporting C-141 aircraft and a 9,000-foot asphalt runway capable of supporting C-130 aircraft, and Vahdati Air Base with a 10,450 foot asphalt runway capable of supporting C-141 aircraft.

Airfield maintenance and support facilities for the major airfields are adequate. At the minor airfields, support facilities and airfield maintenance range from adequate to nonexistent. The airfield sites are in various stages of deterioration.

Development projects at Jask airfield consist of a 6,000-foot asphalt runway and extensive support and service facilities, which are in various stages of completion. Substantial additional airfield construction is projected during the Fifth Development Plan, particularly on the offshore islands.

The potential for physical expansion at Shahrokhi Air Base is virtually unlimited. It can support sustained operations of C-141 aircraft. Physical expansion at Vahdati Air Base is also unlimited. It can support sustained operations of C-141 aircraft or a fighter wing. The potential for physical expansion at Tehran/Doshan Tappeh is limited by the proximity of the city limits to the airfield. It can support sustained operations of C-130 aircraft.

Figure 10 lists characteristics of the most important airfields.

FIGURE 10. Selected airfields (C)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE; DIMENSIONS; ELEVATION ABOVE SEA LEVEL	ESWL*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	Feet	*Pounds*		
Abadan International..... 30°22′N., 48°14′E.	Asphalt..... 10,170 x 148 10	56,607	C-121.....	Joint. International airfield. Jet fuel and avgas available.
Agha Jari..... 30°45′N., 49°40′E.	Asphalt..... 6,970 x 148(S) 80	35,500	DC-4.....	Civil. Maintained by National Iranian Oil Co. Jet fuel and avgas available.
Bandar Abbas International... 27°14′N., 56°23′E.	Asphalt..... 12,007 x 148 15	66,560	C-130.....	Joint. International airfield. Jet fuel and avgas available.

Footnotes at end of table.

FIGURE 10. Selected airfields (C) *(Continued)*

NAME AND LOCATION	LONGEST RUNWAY: SURFACE; DIMENSIONS; ELEVATION ABOVE SEA LEVEL	ESWL*	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
	Feet	*Pounds*		
Bushehr 28°57′N., 50°50′E.	Asphalt 11,250 x 148 14	56,607	C-130	Joint. Jet fuel and avgas available.
Esfahan 32°37′N., 51°42′E.	Asphalt 11,483 x 148 5,242	33,000	C-118	Joint. Used by Iran Air and Imperial Iranian Army. Jet fuel and avgas available.
Gach Saran New 30°20′N., 50°49′E.	Asphalt 6,000 x 148 2,346	33,000	DC-6	Civil. Used by Iran Air and Iranian National Oil Co. Maintained by oil co. Jet fuel and avgas available.
Kerman 30°16′N., 56°57′E.	Asphalt 9,500 x 148 5,735	60,160	727	Civil. Jet fuel and avgas available. No known maintenance.
Kermanshah North 34°21′N., 47°09′E.	Asphalt 8,858 x 148 4,310	59,893	707	Civil. No fuel available.
Khark Island 29°16′N., 50°19′E.	Asphalt 5,125 x 148 10	33,000	DC-6	Civil. Serves National Iranian Oil Co's. large facilities. Jet fuel and avgas available.
Mashhad 36°14′N., 59°39′E.	Concrete 12,497 x 148 3,245	65,100	C-121	Joint. Jet fuel and avgas available in limited amounts.
Masjed Soleyman 32°00′N., 49°17′E.	Asphalt 4,600 x 98 1,196	35,500	DC-4	Civil. Jet fuel and avgas available.
Rasht International 37°20′N., 49°37′E.	Asphalt 7,550 x 148(S) −45	60,160	707	Civil. Second-class International airfield.
Rezaiyeh International 37°40′N., 45°04′E.	Asphalt 9,575 x 148 4,254	60,160	707	Civil. Second-class International airfield.
Shahrokhi AB 35°13′N., 48°39′E. NNE. of Hamadan	Asphalt 14,625 x 150 5,565	66,560	C-130	Military. Jet fuel and avgas available. Fighter base.
Shiraz International 29°32′N., 52°35′E.	Asphalt 14,718 x 148 4,912	66,560	C-130	Joint. International airfield. Jet fuel and avgas available.
Tabriz 38°08′N., 46°15′E.	Asphalt 12,000 x 148 4,483	60,160	C-135	Joint. Jet fuel and avgas available.
Tehran/Doshan Tappeh 35°42′N., 51°29′E.	Asphalt 6,500 x 148(S) 4,000	35,500	C-130	Military. Headquarters Imperial Iranian Air Force and principal supply depot in Iran. Jet fuel and avgas available.
Tehran/Mehrabad 35°41′N., 51°19′E.	Asphalt 13,123 x 148 3,949	66,560	C-135	Joint. International airfield. Jet fuel and avgas available.
Vahdati AB 32°26′N., 48°24′E. N. of Dezful	Asphalt 10,450 x 151 495	66,560	C-130	Military. Jet fuel and avgas available. Fighter base.
Yazd West 31°54′N., 54°17′E.	Asphalt 8,500 x 150 4,060	59,893	DC-7	Civil. No known maintenance. Avgas available in limited amounts.
Zahedan 29°27′N., 60°54′E.	Asphalt 8,620 x 148 4,521	60,160	727	Civil. Airport of entry. Avgas and jet fuel available. Limited maintenance.

*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.

J. Telecommunications (C)

The Iranian telecommunication (telecom) system has undergone rapid and extensive improvements in the last 2 years. In 1970, Iran signed a contract for a huge telecom project that was scheduled for completion in late 1972. This project, probably the world's largest ever undertaken in an unprecedented short time, contained priority requirements which called for the installation of countrywide very-high-frequency and ultra-high-frequency radio-relay links, troposcatter radio, and cable links. The government's ultimate goal is the construction of the Integrated National Telecommunications System (INTS) that would eliminate the chief weaknesses of the former system—low capacity and lack of integration of facilities. The principal telecom center is Tehran; secondary centers are Esfahan, Mashhad, and Tabriz. Successful completion of current work, in bringing modern service to the public, local and central governments, business, and industry and in connecting all ports, mining, marketing, and administrative centers, will contribute to continuation of one of the world's highest rates of economic growth. Quality of service to these governmental and economic sectors is good and was to be excellent by the end of 1972. The total number of telephones, 307,500 in January 1971, second only to Israel in the Middle East, is also increasing. Accomplishment of current projects will give Iran one of the most developed telecom systems in the world.

Telecom administration is the function of the Ministry of Post, Telegraph and Telephone (PTT). In March 1972 the state-owned Iran Communications Company (ICC) replaced the Iran Telephone Company. The ICC, which is subordinate to the PTT, is responsible for construction and maintenance of domestic and international networks. Programing of the national radio and television broadcasting organization is supervised by the Ministry of Information. Iran is a member of the International Telecommunications Union (ITU), International Telecommunications Satellite Consortium (INTELSAT), and Asian Broadcasting Union (ABU); it is also an associate member of the European Broadcasting Union (EBU). Special-telecom systems are administered by several agencies, the most significant being the Ministry of War and the National Iranian Oil Company (NIOC).

Domestic long-distance facilities consist primarily of radio-relay links. Under the contract of the General Telephone and Electronics International of Canada and Italy, Nippon Electric Company of Japan, Page Communications Engineers of the United States, and Siemens AG of West Germany, known collectively as the GNPS Consortium, 253 first-priority microwave sites were completed by February 1972, and 294 more are scheduled for completion by the end of 1973. This network is designed to connect all cities and towns from Tabriz to Bandar 'Abbas and provide direct-distance dialing, radiobroadcast, TV channels, telex, and data transmission. Capacities of trunk lines are 1,200 telephone channels and a TV channel. Secondary connections from the main network are by carrier-equipped open-wire lines, cables, and tropospheric links.

Telephone exchanges are being modernized and expanded in all cities and towns under a concurrent construction program that was to be largely accomplished in 1972. The expansion program for automatic exchanges is on schedule, and the present number of lines is estimated at about 600,000. Telephone expansion, which began in November 1970 when the International Bank for Reconstruction and Development gave Iran a US$36 million loan, is to double the number of telephones and greatly increase telex and telegraph service. The total cost of the project was US$149.2 million. In Tehran alone the target for the end of the Fourth Development Plan (ending March 1973) was 31 central telephone exchanges with about 340,000 lines, up from 15 exchanges and 161,900 lines in January 1971. Other urban exchanges throughout the country are being similarly improved.

The most technologically advanced international telecom facility is the communication satellite ground station at Asadabad which works via the Atlantic Ocean INTELSAT. The station, which began operating in October 1969, provides telephone, telegraph, and telex, or one TV channel. It is connected by a 1,200-channel radio-relay link to the international switching center at Tehran and from there to the rest of the country. An important link, originally built for the Central Treaty Organization (CENTO), is a 600-channel radio-relay system from Ankara, Turkey, to Tehran and Karachi, Pakistan. Major international high-frequency radiocommunication facilities, with circuits to many countries, are located at Kamalabad. Less important open-wire lines cross into all adjoining countries except Pakistan.

Special-purpose telecom systems are numerous and extensive. An international facility, the CENTO radio-relay system from Ankara through Tehran to Karachi, previously served as a key link within Iran by leasing circuits to the PTT, but it became less significant with the installation of the huge new

microwave net. Other extensive systems are operated by the various armed services and the gendarmerie. A US$65 million communication and radar net known as project Peace Ruby was recently completed for the Imperial Iranian Air Force with the assistance of the U.S. Air Force. The customs and police have their own networks; the latter is being modernized under a US$20 million contract with a U.S. firm. The NIOC has elaborate radio-relay facilities for oil pipeline control; another radio-relay system, which runs parallel with the north-south gas trunkline, extends to Astara, U.S.S.R. Additional special systems are operated by transportation and other government agencies.

Radiobroadcast AM stations with multiple transmitters are located at some 17 cities, providing complete coverage of populous areas on medium frequency. High-frequency transmitters are installed at a few cities for national and international transmissions, the main ones are at Kamalabad near Tehran. The only FM station is at Tehran broadcasting two programs. TV stations are at many of the same cities as the AM stations, and more of both stations are under construction. In 1970 the number of radiobroadcast receivers in use was about 3 million, and in 1972 TV receivers totaled about 700,000.

Telecom installations are vulnerable to sabotage because of the vastness of territory and limitations of security forces to guard them. Upon completion of present projects, many alternate routes will be available. Extreme conditions of terrain and climate make parts of Iran very difficult for telecom construction and maintenance.

The small domestic telecom industry assembles radiobroadcast and TV receivers, automatic telephone exchanges, telephone instruments, and military field radios. All other large and complex equipment, wire and cable, and military apparatus are imported chiefly from Japan, the United States, West Germany, and secondarily from Canada and the Netherlands.

Iran has better telecom training schools than other Middle East countries, but the large demands of the INTS projects have drained the country of talent. A part of the GNPS Consortium contract is the training of 1,000 new middle-level operating and maintenance personnel by Page Communications Engineers.

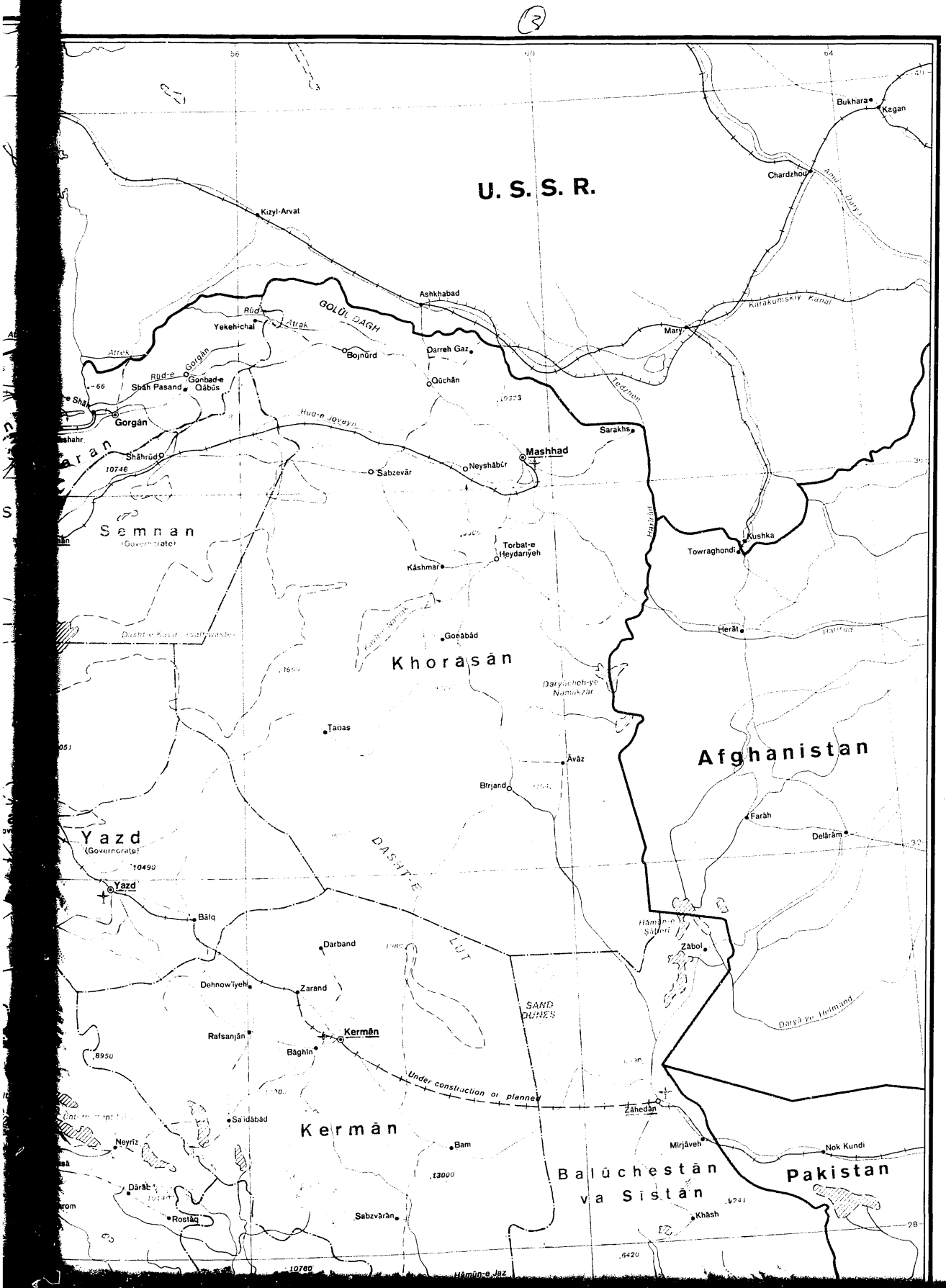
In addition to the many telecom projects underway, major future projects include a second satellite ground station which will link with the Indian Ocean INTELSAT, continued expansion and improvement of the internal telecom network, new TV and radiobroadcast stations, and the introduction of color TV.

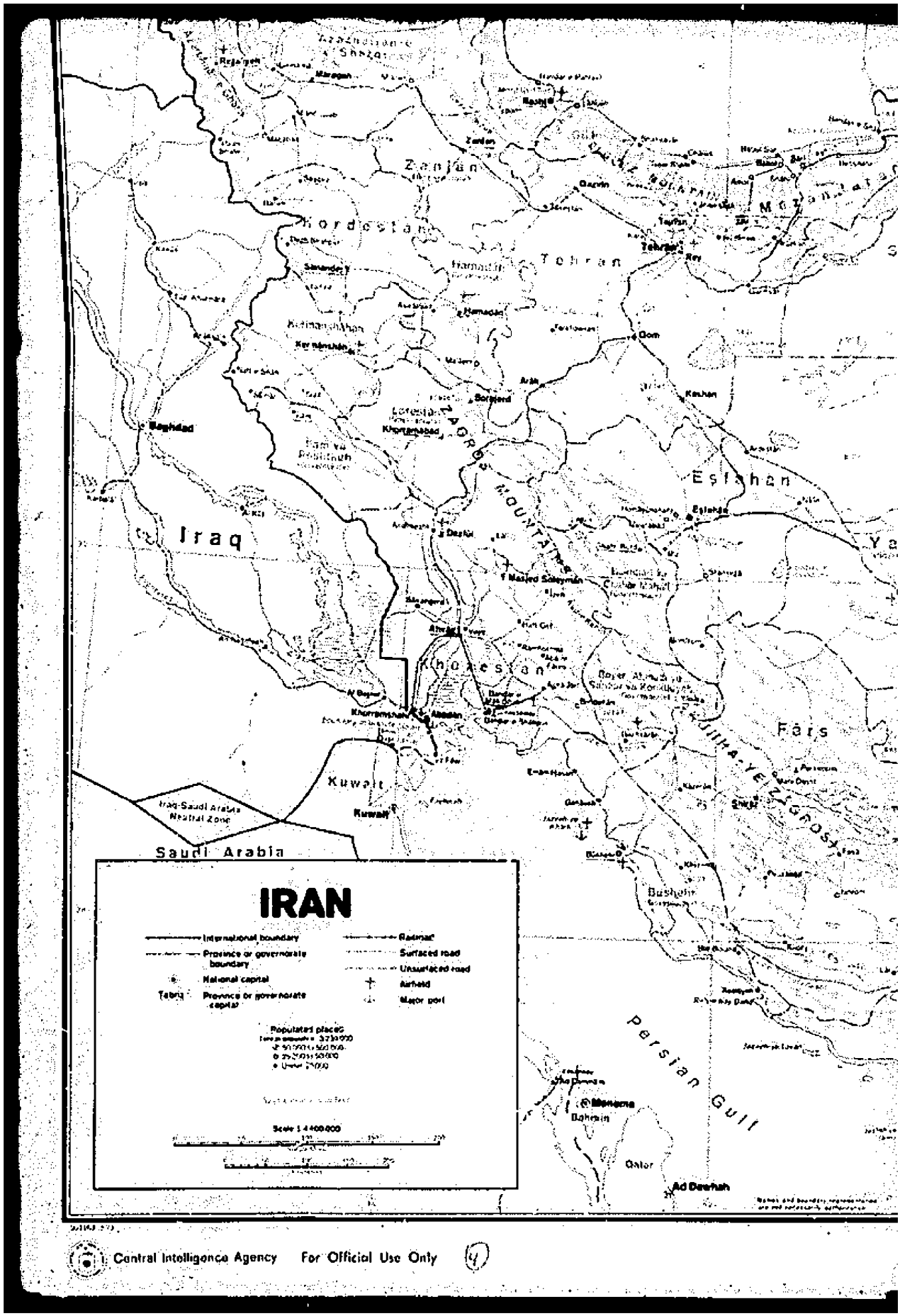
Places and features referred to in this General Survey (U OU)

	COORDINATES			
	°	'N.	°	'E.
Ābād	38	11	45	56
Ābādān	30	20	48	16
Āghā Jārī	30	42	49	50
Ahvāz	31	19	48	42
Andimeshk	32	27	48	21
Arāk	34	05	49	41
Aras River (*strm*)	39	56	48	20
Asadābād	34	47	48	07
'Asalūyeh	27	28	52	37
Āstārā	38	26	48	52
Bād	31	41	52	01
Bāfq	31	35	55	24
Bāghīn	30	12	56	18
Bahmanshīr, Khowr-e (*strm*)	30	02	48	41
Baku, U.S.S.R.	40	23	49	51
Bandar 'Abbās	27	11	56	17
Bandar-e Lengeh	26	33	54	53
Bandar-e Māh Shahr	30	33	49	12
Bandar-e Pahlavi	37	28	49	27
Bandar-e Shāh	36	56	54	06
Bandar-e Shāhpūr	30	25	49	05
Bang	29	41	50	19
Bīd Boland	27	51	52	19
Bīnak (*oilfield*)	29	45	50	22
Bojnūrd	37	28	57	19
Būshehr	28	59	52	50
Chāh Bahār	25	18	60	37
Dasht-e Kavīr (*desert*)	34	40	54	30
Dezfūl	32	23	48	24
Dez, Rūd-e (*strm*)	31	39	48	52
Elburz Mountains (*mts*)	36	00	53	00
Emām Hasan	29	52	50	15
Esfahān	32	40	51	38
Farahābād	35	42	51	30
Fīrūz Kuh	35	45	52	47
Gachsārān	30	12	50	47
Ganāveh	29	32	50	31
Garmsār	35	20	52	13
Golmānkhāneh	37	36	45	15
Gorgān	36	50	54	29
Gorgān, Rūd-e (*strm*)	36	59	54	05
Gulf of Oman (*gulf*)	25	00	58	00
Hafar Channel (*see of strm*)	30	26	48	10
Hamadān	34	48	48	30
Hendījān	30	14	49	43
Hendījān (*offshore oilfield*)	30	05	49	50
Herāt, Afghanistan	34	20	62	12
Hindu Kush, Afghanistan (*mts*)	35	00	71	00
Hōrmoz	27	06	56	28
Hormoz, Strait of	26	34	56	15
Jāsk	25	38	57	46
Jolfā	38	57	45	38
Kamālābād	28	49	61	27
Karaj	35	48	50	59
Karakose, Turkey	39	44	43	03
Karbalā', Iraq	32	36	44	02
Kārūn Bar (*bar*)	30	24	48	44
Kārūn, Rūd-e (*strm*)	30	26	48	10
Kāshān	33	59	51	29
Kāzerūn	29	37	51	38
Kermān	30	17	57	05
Kermānshāh	34	19	47	04
Khārk, Jazireh-ye	29	15	50	20
Khārk (Kharg), Jazireh-ye (*pipeline term*)	29	15	50	20
Khorramābād	33	30	48	20
Khorramshahr	30	25	48	11
Khosrowābād	30	10	48	25
Khūzestān (*regn*)	30	30	50	00
Khvoy	38	33	44	58
Kizyl-Arvat, U.S.S.R.	38	58	56	15
Lake Urmia (*lake*)	[illegible]	10	45	30
Lālī	[illegible]	4	49	06
Lashkarak	[illegible]	19	51	36
Lāvān, Jazireh-ye (*isl*)	26	48	53	15
Leytā	35	47	51	11
Mahābād	36	45	45	43
Manjil	36	44	49	24
Marand	38	26	45	46
Marathón, Greece	38	09	23	58
Mārūn, Rūd-e (*strm*)	31	05	49	36
Mashhad	36	18	59	36
Māh Shahr, Khowr-e (*channel*)	30	26	49	09
Masjed Soleymān	31	58	49	18
Mendāb	36	02	48	01
Mirjāveh	29	01	61	28
Musa, Khowr-e (*inlet*)	30	18	48	55
Naft-e Shāh	33	59	45	30
Na'īn	32	52	53	05
Nikshahr	26	13	60	12
Nok Kundi, Pakistan	28	48	62	46
Now Rūz (*offshore oilfield*)	29	30	49	25
Now Shahr	36	39	51	31
Pasargadae (*ancient site*)	30	17	53	13
Pāzanān	30	35	49	59
Persepolis (*site*)	29	57	52	52
Persian Gulf (*gulf*)	27	00	51	00
Pishīn	26	06	61	47
Qareh Sū (*strm*)	34	52	51	25
Qazvīn	36	16	50	00
Qazvīn (*rgn*)	35	30	50	30
Qeshm (*isl*)	26	45	55	45
Qom	34	39	50	54
Qotūr	38	28	44	25
Quchan	37	06	58	30
Rafsanjān	30	24	56	01
Rahmanlū	37	32	45	18
Rakhsh (*offshore oilfield*)	26	25	52	10
Rasht	37	16	49	36
Rāy	31	50	59	58
Reza'iyeh	37	33	45	04
Riz	32	23	51	20
Robāt Karīm	35	28	51	05
Rostam (*offshore oilfield*)	25	55	52	54
Safīd Rūd (*strm*)	37	26	49	55
Sanandaj	35	19	47	00
Sarajeh	34	36	51	04
Sarakhs	36	32	61	11
Sārī	36	34	53	04
Semnan	35	33	53	24
Sendarak	26	50	57	25
Shāh Pasand	37	07	55	16
Shāhrūd	36	25	55	01
Shalīl-ye Bala	31	59	48	52
Shamsābād	33	49	49	45
Sharafkhāneh	38	11	45	29
Shatt al Arab	29	57	48	34
Shīraz	29	36	52	32
Sūfīān	38	17	45	59
Soltānī, Khowr-e (*bay*)	29	00	50	50
Strait of Hormuz (*str*)	26	34	56	15
Sūfīān	38	17	45	59
Tabas	33	36	56	54
Tabrīz	38	05	46	18
Tajrīsh	35	48	51	25
Takestān	36	04	49	43
Tarasht	33	58	57	13
Tehrān	35	40	51	26
Tembī	31	55	49	17
Torbat-e Heydarīyeh	35	16	59	13
Veys	31	29	48	52
Yazd	31	53	54	25
Yerevan, U.S.S.R.	40	11	44	30
Zagros Mountains (*mts*)	33	40	47	00
Zarand	30	48	56	35
Zāhedān	29	30	60	52
Zāyandeh Rūd (*strm*)	32	20	52	50

SELECTED AIRFIELDS

Abadan International	30	22	48	14
Agha Jari	30	45	49	40
Bandar Abbas International	27	14	56	23
Bushehr	28	57	50	50
Esfahan	32	37	51	42
Cach Saran New	30	20	50	49
Kerman	30	16	56	57
Kermanshah North	34	21	47	09
Khark Island	29	16	50	19
Mashhad	36	14	59	39
Masjed Soleiman	32	00	49	17
Rasht International	37	20	49	37
Rezaiyeh International	37	40	45	04
Shahrokhi	35	13	48	39
Shiraz International	29	32	52	35
Tabriz	38	08	46	15
Tehran Doshan Tappeh	35	42	51	20
Tehran Mehrabad	35	41	51	19
Vahdati	32	26	48	24
Yazd West	31	54	54	17
Zahedan	29	27	60	54





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Terrain and Transportation Figure 11