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HIGHWAY FEASIBILITY STUDIES, LATTAKIA REGION

ALIGNMENT SELECTION REPORT
Lattakia to Ariha

prepared for the
SYRIAN ARAB REPUBLIC
and the
U.S. AGENCY for
INTERNATIONAL DEVELOPMENT

LYON associates, inc.
in association with
MORRISON - MAIERLE, INC. and
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25 October 1978
78MM-1565

Mr. Douglas A. Campbell, Contracting Officer
Regional Operations Division - NE
Office of Contract Management
Department of State
Agency for International Development
Washington, D. C. 20523

Subject: Highway Feasibility Studies
Lattakia Region-Syrian Arab Republic
Contract No. AID/NE-C-1459 (Syria)

Gentlemen:

Lyon Associates, Inc., in association with Morrison-Maierle, Inc. and James R. Snitzler Associates, Inc. is pleased to transmit herewith two copies of the Alignment Selection Report for the Lattakia-Ariha segment of the subject project. We are also submitting six copies to SARG and two copies to USAID/Damascus. The alignment recommended in this report was developed in close cooperation with the Ministry of Communications, Syrian Arab Republic, and all concerns expressed by them to date have been accommodated in the report.

The alignment recommendation takes into account the existing and forecast traffic patterns and volumes, the limitations of terrain and culture, environmental considerations, soils conditions, stream crossings, and other economic and engineering factors in an effort to maximize future vehicle user cost savings at minimum cost of construction.

Please note that this Alignment Selection Report is by far more comprehensive than required by the scope of services for this submittal. Sections have been included for economics, transportation analysis, and transport economic analysis thus providing your review staff with data and analyses that are usually not available until submittal of the Draft Final Report. We feel that the inclusion of this material will be mutually beneficial and ultimately result in an earlier approval of the Draft Final Report.

ALASKA
CALIFORNIA
HAWAII
MARYLAND
VIRGINIA
GUAM
INDONESIA
IRAN
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LEBANON
LIBERIA
MALAYSIA
PHILIPPINES
SOUTH AMERICA
TANZANIA
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TRUST TERRITORY

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Mr. Douglas A. Campbell
Page Two

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We have previously (16 August 1978) provided copies of the alignment drawings to the M.O.C. to assist them with solicitation of timely comments on the alignment by other concerned government agencies.

We request your review comments at the earliest possible date and will be glad to discuss any portion of this report with you or your staff in Washington and/or Damascus.

Very truly yours,

LYON ASSOCIATES, INC.

Fredrick Everhardt
Secretary-Treasurer

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encls

2

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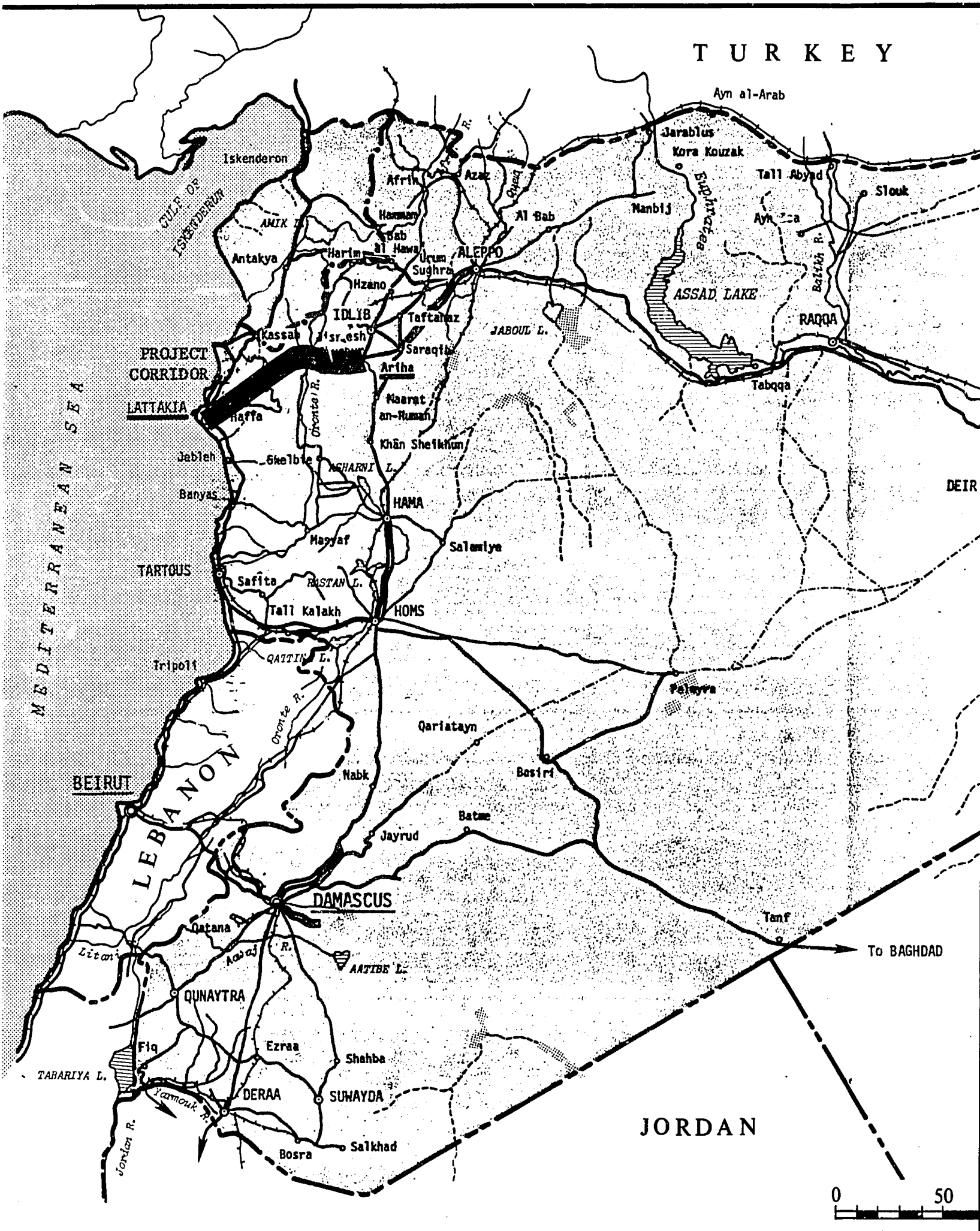
Part I

INTRODUCTION

INTRODUCTION

The United States Agency for International Development (USAID) on 23 November 1977 awarded a contract to Lyon Associates, Inc., a consulting engineering firm incorporated at Baltimore, Maryland, for technical, economic, and environmental studies to determine the feasibility of and the most economical design for the highway between Tartous and Lattakia, between Lattakia and Kassab, and between Lattakia and Ariha. The purpose of the studies is to determine the most favorable alignments and design standards, and to assess the total economic benefits and costs of each of the three road segments above described.

This volume, the Alignment Selection Report, Lattakia to Ariha is the first of five reports which relate solely to the Lattakia to Ariha segment. It presents the preliminary alignment selected on the basis of field reconnaissance and map studies made in conjunction with economic studies of growth patterns and studies of present traffic volumes. The report presents an engineering analysis of the physical facility needed, an analysis of the physical and cultural restrictions affecting the possible alternative routes and comparisons of economic consequences of reasonable alternatives. This report concludes with a recommendation for the route to be further studied to refine the alignment, prepare preliminary technical drawings and construction cost estimates, estimate running cost savings, estimate general economic benefits and costs, and determine the economic and technical feasibility of the selected route.


TURKEY
Ayn al-Arab
Jarablus
Kora Kouzak
Tall Abyad
Slouk
Iskenderon
GULF OF ISKENDERUN
Afrin
Azaz
Qweq
Al Bab
Manbij
Euphrates
Ayn Isa
Balikh R.
AMIK L.
Hamman
Bab al Hawa
Antakya
Harim
Urum Sughra
ALEPPO
Hzano
ASSAD LAKE
IDLIB
Taftanaz
RAQQA
Kassab
Jisr esh
JABOUL L.
PROJECT CORRIDOR
Saraqib
Ariha
Tabqqa
LATTAKIA
Haffa
Orontes R.
Maarat an-Numan
Khān Sheikhun
Jebleh
Qkelbie
AGHARNI L.
DEIR
Banyas
HAMA
Mayyaf
Salamiya
MEDITERRANEAN SEA
TARTOUS
Safita
RASTAN L.
Tall Kalakh
HOMS
QATTIN L.
Tripoli
Palmyra
Qariatayn
Orontes R.
LEBANON
Nabk
Bosiri
BEIRUT
Batme
Jayrud
DAMASCUS
Qatana
Tanf
Litani
Awaj R.
AATIBE L.
To BAGHDAD
QUNAYTRA
Fiq
Ezraa
Shahba
TABARIYA L.
Yarmouk R.
DERAA
SUWAYDA
JORDAN
Jordan R.
Salkhad
Bosra
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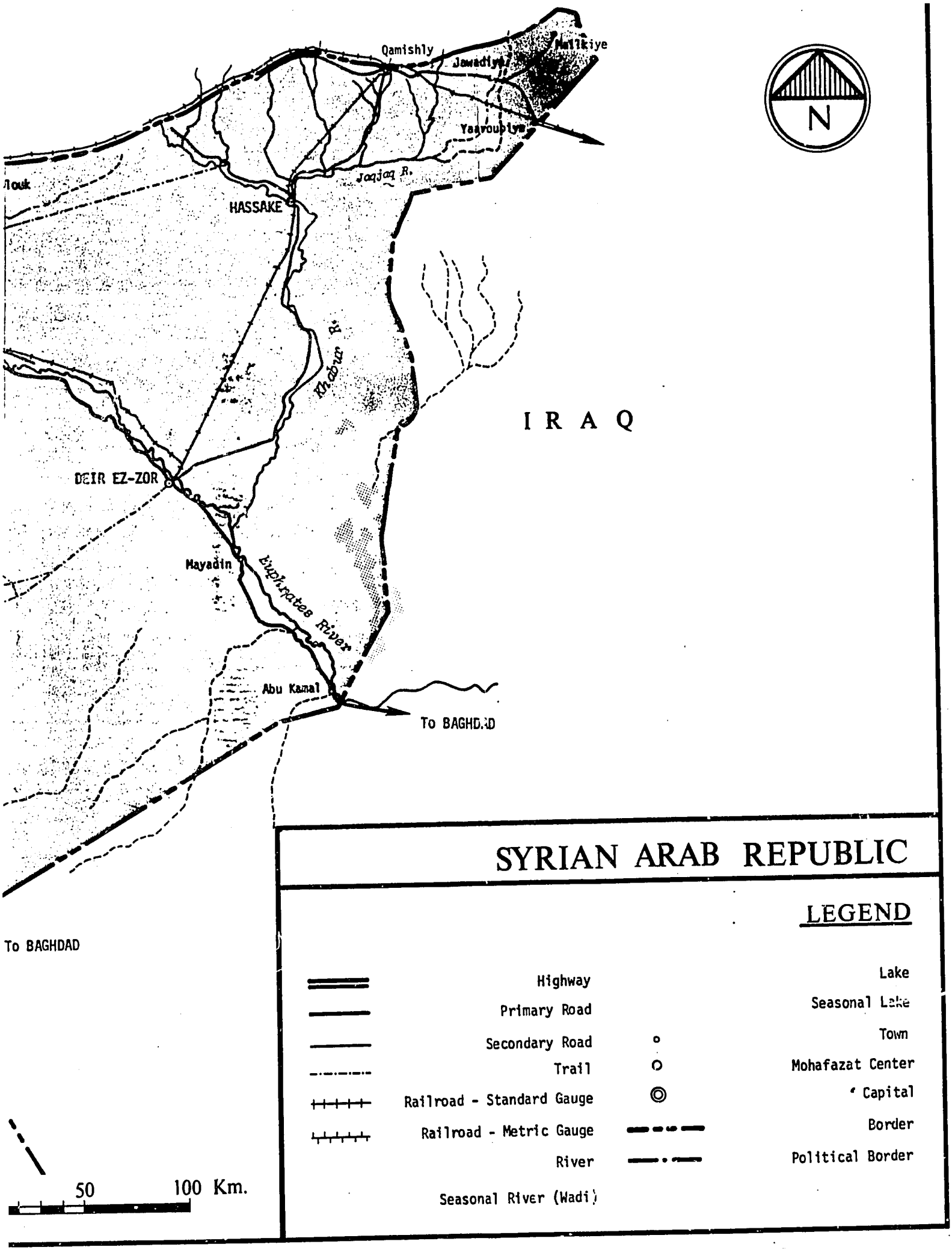
50


Qamishly
Malikiye
Jawadiye
Yaaroubiye
Jaqjaq R.
HASSAKE
Khabur R.
IRAQ
DEIR EZ-ZOR
Mayadin
Euphrates River
Abu Kamal
To BAGHDAD
To BAGHDAD
N
SYRIAN ARAB REPUBLIC
LEGEND
Highway
Primary Road
Secondary Road
Trail
Railroad - Standard Gauge
Railroad - Metric Gauge
River
Seasonal River (Wadi)
Lake
Seasonal Lake
Town
Mohafazat Center
Capital
Border
Political Border
50
100 Km.

Part II

SUMMARY

SUMMARY

The transport corridor between Lattakia and Ariha is narrow and, due to limitations of mountainous terrain, does not present a wide array of alternative routes between the major terminals. The zone of economic influence is 2,519 square kilometers in area, and as of 1976 had an estimated population of 275,676. The population growth rate in the zone of influence is 2.7 percent per year. The population is largely rural in nature.

Traffic in the corridor is largely port oriented as Lattakia and, further south, Tartous, are the two primary ports for handling general cargo bound to, or originating in, Syria (and certain areas of neighboring countries). There is also substantial petroleum product traffic between Banyas and the interior which travels through the project corridor. Growth rates based on preliminary economic studies are shown in Table II-1.

TABLE II-1
PRELIMINARY ESTIMATES OF GROWTH RATES

Type	1978-1983	1984-1993	1994-2003
Automobiles	10.5	8.7	6.2
Buses	9.2	8.1	6.1
Trucks	9.1	6.9	5.5

Projections of future traffic volume based on the above tabulated growth rates applied to 1978 traffic counts are shown in Table II-2.

The forecast traffic has a high truck component which generally argues well for four lane divided highways where traffic volume is high. A four lane facility with limited access will therefore be desirable in the near future. The economic determinations of optimum stage timing for various

TABLE II-2
PROJECTED TRAFFIC

Sector	Year	Automobiles and Pickups	Buses and Microbuses	Trucks[1/]	Total
Lattakia to Haffe/Slenfe Road Intersection	1978	673	206	735	1,614
	1984	1,109	320	1,136	2,565
	1994	2,554	697	2,841	6,092
	2003	4,389	1,188	4,600	10,177
Haffe/Slenfe Road Intersection to Jisr esh Shugur	1978	480	96	685	1,261
	1984	791	149	1,059	1,999
	1994	1,822	325	2,649	4,796
	2003	3,131	554	4,289	7,974
Jisr esh Shugur to Ariha	1978	905	120	708	1,733
	1984	1,491	186	1,094	2,771
	1994	3,434	405	2,736	6,575
	2003	5,901	690	4,430	11,021

1/ Excludes Military Trucks.

stages of construction will be the subject of study in the Draft Final Report for the Lattakia-Ariha segment. For purpose of alignment selection it is assumed that the ultimate facility to be sited is a multi-lane divided highway with limited access and carrying up to 11,000 vehicles per day. The facility requirements are based on a four lane facility and are generally in agreement with recommendations of AASHTO and/or the current practices of expressway design in Syria.

The recommended alignment of the expressway extends northwesterly from its intersection with the proposed new expressway route from Tartous to Lattakia, at a point south east of the city of Lattakia, to the southeastern terminus of the four lane divided highway to Aleppo approximately 1.5 kilometers west of the town of Ariha via the towns of Jisr esh Shugur and

Mugambil. Approximately one-half of the proposed alignment, follows the existing Lattakia to Ariha road corridor. The remainder of the proposed route includes four sections, totaling approximately 47.3 kilometers, completely separated from the existing road. These sections include: the first 25.8 kilometers east of Lattakia to avoid planned development areas; 3.5 kilometers across the ridge line of Al Nusayriyah Mountains to avoid severing . of developed lands; 12 kilometers for bypassing the town of Jisr esh Shugur and, 6 kilometers for bypassing the town of Mugambil. The proposed alignment is approximately 99.5 kilometers in length affecting a savings in travel distance between Lattakia and Ariha of about 10 kilometers.

Part III

ECONOMICS

E C O N O M I C S

SUMMARY DIAGNOSIS OF THE ZONE OF INFLUENCE

Zone of Influence Limits

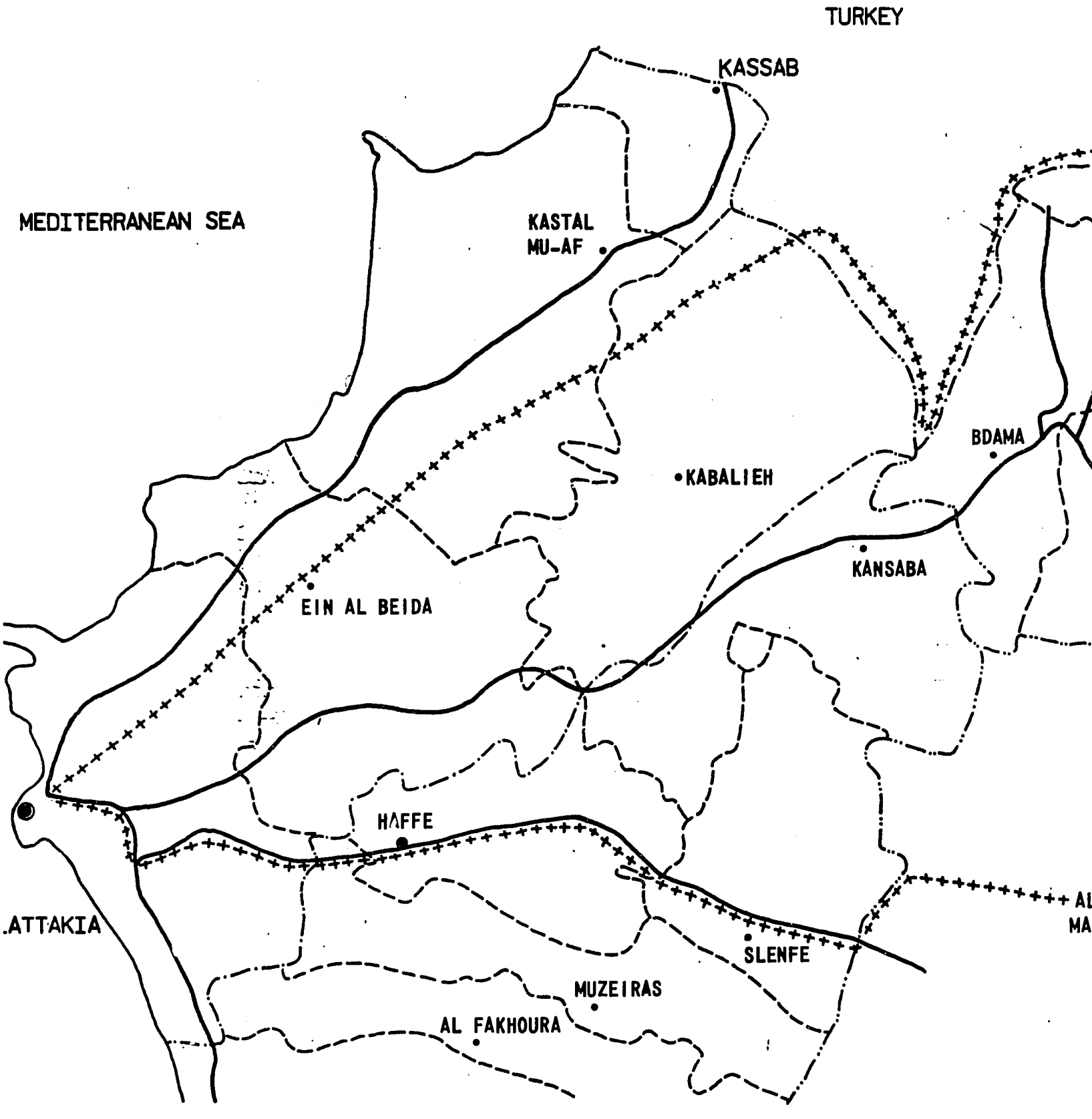
The primary zone of influence of the Lattakia-Ariha highway, as shown on following plate (overleaf) is about 110 km. in length by 22.9 km. in width and has an area of approximately 2,519 square kilomters. The zone extends from the outskirts of Lattakia in a northeasterly direction to the city of Jisr esh Shugur, and thence to the city of Ariha. About 32 percent of the zone lies in Lattakia Mohafazat, 61 percent in Idlib Mohafazat, and 7 percent in Hama Mohafazat.

Topography

From the city of Lattakia northeasterly, the first 15 km. of the project corridor traverses the coastal plain and the broad valley of Al Kabir Al Shamaly River. Then the corridor follows the narrowing valley of the river flanked by limestone hills for an additional 15 km. For the following 30 km., the zone traverses hilly terrain along narrow stream valleys. At about 60 km. from Lattakia, the zone descends from the mountain ridges into El Gahab valley, which is relatively smooth. Easterly, the road zone of influence then passes through limestone hills to the terminus at Ariha.

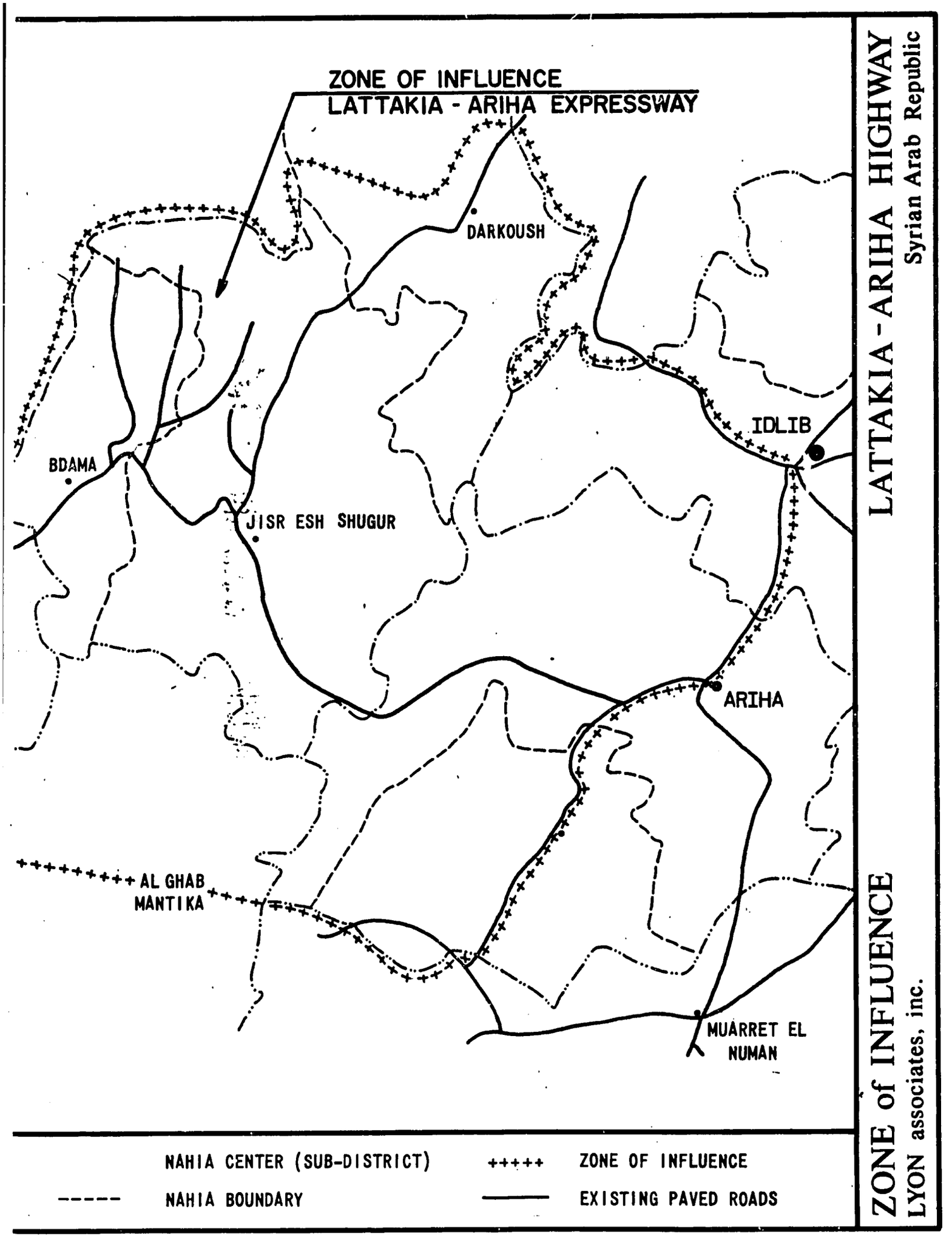
Population

The population for the zone of influence is estimated at 275,676 in 1976; having increased to about 40,700 above the 1970 census report. This increase resulted from a 2.7 percent annual growth rate, which is substantially



MOHAFAZAT CENTER (PROVINCE) | MANTIKA CENTER (DISTRICT) | •

MOHAFAZAT BOUNDARY | MANTIKA BOUNDARY | - - - - -


ZONE OF INFLUENCE
LATTAKIA - ARIHA EXPRESSWAY
DARKOUSH
IDLIB
BDAMA
JISR ESH SHUGUR
ARIHA
AL GHAB
MANTIKA
MUARRET EL
NUMAN
NAHIA CENTER (SUB-DISTRICT)
NAHIA BOUNDARY
ZONE OF INFLUENCE
EXISTING PAVED ROADS
LATTAKIA-ARIHA HIGHWAY
Syrian Arab Republic
ZONE of INFLUENCE
LYON associates, inc.

lower than the national growth rate of 3.3 percent. About 62 percent of the zone's total population resides in the Lattakia and Jisr ash Shugur Mantikas. The present population is predominantly young; 48.9 percent is composed of persons below age 15. This age characterization is similar to that of the nation as a whole.

Agriculture

Tilled crops are generally limited to the coastal plain and the broad river valley in the 30 km. long zone extending northeasterly from Lattakia, and to the broad zone traversing the Orontes River basin. The limestone slopes and hills through which the zone passes are generally covered by olive orchards at lower elevations, but on steeper slopes there is little or no agricultural production of any sort.

The arable lands that are not stoney are intensively cropped to vegetables where soil drainage is adequate, and to wheat and barley on soils that are imperfectly drained in the winter rainy season. Tree fruits (predominantly olives) are grown on stoney lands, with some apples, apricots, pears, grapes, figs, and pomegranates grown to lesser extent, both on stoney lands of the coastal plain and at higher elevations on alluvial soils along the streams flowing westward out of the north-south range of mountains. Citrus orchards are successful on coastal plain soils with good drainage. In the coastal plain and alluvial soils of stream basins, the growth of vegetables predominates, both with natural rainfall and with irrigation where water is available by pumping from streams or shallow wells.

Livestock production is poorly developed, and has not grown significantly in the last decade. The physical resources are available for including livestock in farming systems, for producing meats, milk, poultry and eggs; but current programs have not stimulated the livestock components of farming

beyond family subsistance levels.

Sugar beets are grown in El Gahab valley, and are processed at a sugar mill at Jisr esh Shugur. Sheep (for meat, wool, and milk) are more important in the Gahab valley than in the western zone. The farming systems of the Gahab basin include more forage crops for livestock feeding than are found elsewhere in the zone.

Total agricultural production in 1976, for all categories of crops and livestock products, amounted to about 206,800 MT for the Lattakia-Ariha zone of influence. It was estimated that 164,400 MT constituted the marketable surplus (in excess of subsistance needs of growers).

Industry

Industrial activity in the Lattakia-Ariha zone of influence centers primarily on manufacturing and quarrying.

The manufacturing enterprises engage mainly in the processing of agricultural products, especially foodstuffs, as well as cotton textiles and other wearing apparel. Other manufacturing firms are involved in fabricating tile, wood and metal products. The total physical volume of manufacturing firms within the zone of influence was estimated at 1.1 million MT in 1976.

The quarrying industry within the zone had an estimated physical volume of 1.4 million MT in 1976. This output was used primarily for construction of buildings and roads: about 0.7 million MT of sand and gravel and about 0.6 million MT of stone. The quarrying industry also produced smaller quantities of natural asphalt, gypsum and semi-marble stone.

Tourism

Tourism in the Lattakia-Ariha zone of influence is a minor activity, since the zone has no seacoast, and the roads leading to local tells (hills of ancient civilizations) medieval castles, Roman aqueducts, etc., are not

easily traversed. Also, the travel routes for incoming tourists from other countries rarely include the project corridor. The limited nature of tourism in the Lattakia-Ariha zone as recorded for Idlib Mahafazat, is indicated in Table III-1

TABLE III-1

Tourist Type	Number of Tourists 1975	1976	1977
Foreign Non-Arab	8	106	97
Non-Syrian Arab	229	351	344
Syrian	12,106	11,714	9,839

The folow of tourists in generally greatest from April to October, because of favorable weather in that season. Efforts are being made to strengthen tourism in other seasons by providing more adequate lodgings, food, transport, guides, and pertinent printed information. The Ministry of Tourism has responsibility for such efforts.

PRELIMINARY PROJECTIONS OF POPULATION AND ECONOMIC ACTIVITY

Population

Population of the zone of influence was estimated by the consultants at about 276,700 in 1976. This estimate is based upon the extrapolation of the 1960-1970 population growth rate of 2.7 percent. Projected population and growth rates for the future periods, 1976-2003 are as shown in Table III-2.

TABLE III-2
PROJECTED POPULATION AND GROWTH RATES

Period	Estimated Population	Annual Average Growth Rate
1976-1983	335,700	2.8
1984-1993	438,200	2.7
1994-2003	560,900	2.5

These projected rates are expected to remain at relatively low levels because of the largely rural nature of the population and the substantial tendency toward migration to the urban centers of Lattakia and Aleppo.

Agriculture

Total agricultural production in the zone of influence equaled 206,800 tons, of which 164,400 tons represented marketable surplus. The historical annual average production growth for the zone was 6.3 percent for the periods 1970-1972 and 1974-1976. For the projected periods, 1976-1983, the annual average rate is expected to increase to 9.3 percent based upon the Consultants' assumption, utilizing information from governmental sources, of the termination of negative growth rates for industrial crops, livestock and products over the historical period. Stable production over the projected period is assumed for these agricultural units. In the absence of these negative rates, the weighted average rate of historical growth becomes 9.3 percent with the individual historical rates being as follows:

Vegatables	9.0 percent
Fruit	8.5 percent
Cereals	10.5 percent

Projections over the twenty-year period, 1984-2003 are based upon the consultant's analysis of the potential versus the achievable marketable surplus for zone of influence, with consideration being given to the natural resources of soils and climate, and the use of technological inputs and supporting services. The projected achievable marketable surplus in tons and by annual average growth rates are shown in Tables III-3 and III-4.

TABLE III-3
AGRICULTURAL MARKETABLE SURPLUS
(000 MT)

	1976	1983	1993	2003
Achievable	164.4	306.4	631.5	1,242.2

TABLE III-4
AGRICULTURAL MARKETABLE SURPLUS
ANNUAL AVERAGE GROWTH RATES
(PERCENT)

	1976-1983	1984-1993	1994-2003
Achievable	9.3	7.5	7.0

Industry

Total industrial production for the Lattakia-Ariha zone of influence was estimated at about 2.5 million tons in 1976. This production consisted of about 1.1 million tons of manufactured products and 1.4 million tons of quarry products. Analysis of national trends, and discussions with industry officials in the zone indicate that industrial growth in the future would be of the order of magnitude by category of industrial activity as shown in Table III.5.

TABLE III-5
INDUSTRIAL PRODUCTION

	1976	1983	1993	2003
		(000 MT)		
Manufacturing	1,075.4	1,965.9	4,244.2	7,600.2
Quarrying	1,447.7	3,005.6	5,912.4	9,630.6
Total	2,523.1	4,971.5	10,156.6	17,230.8

The annual average growth rates of the industrial sector for the period 1976-2003 are as shown in Table III-6.

TABLE III-6
INDUSTRIAL PRODUCTION
ANNUAL AVERAGE GROWTH RATE
(PERCENT)

	1976-1983	1984-1993	1994-2003
Manufacturing	9.0	8.0	6.0
Quarrying	11.0	7.0	5.0
Weighted Average	10.2	7.4	5.4

General Cargo Exports and Imports

General cargo exports and imports, which exclude crude petroleum, moving through the Ports of Lattakia and Tartous totaled 4,056,500 tons in 1976. A portion of this import and export tonnage of the two ports terminates and originates within the zone of influence of the Lattakia-Ariha road as well as at points beyond, such as the large city of Aleppo and the north-eastern agricultural area of the country. The amount of this export-import movement via the Lattakia-Ariha road is estimated by the consultants from conversations with port officials, and other knowledgeable persons, at about 1,623,000 tons, or approximately 40 percent of the combined total tonnage in 1976.

For future years, the consultants anticipate that the share of this total export-import tonnage may decline because of railroad competition, but at this stage of the study, data on railroad costs are not available to determine the rails' impact. In the absence of railroad costs, the consultants have assumed that the Lattakia-Ariha road's share of the combined general cargo exports and imports moving via Lattakia and Tartous would be as follows:

	1976	1983	1993	2003
Percentage of Total	40	39	37	34

Based upon the projected combined tonnages of general cargo exports and imports for the two reports as shown in the draft final report of the Lattakia-Tartous Highway Feasibility Study, the tonnages assignable to the Lattakia-Ariha road would be:

1976	1983	1993	2003
	(000 MT)		
1,622.6	2,346.0	3,626.7	4,976.8

The resulting annual average growth rates are as follows:

1976-1983	1984-1993	1994-2003
5.4	4.5	3.2

Transit Traffic

Total international transit traffic moving via the ports of Lattakia and Tartous have been projected by the consultants in the Lattakia-Tartous Draft Final Report as shown in Table III-7. An analysis of the destinations of this transit traffic via the two ports indicates that for the base year 1976, and during the projected period, 1983-2003, only about 10 percent of the total movement would involve use of the Lattakia-Ariha road.

Zone Domestic Imports

In addition to the transport of commodities produced within the zone, as well as foreign imports, there are also commodities which are produced or processed in other regions of Syria, and subsequently transported into the zone as domestic imports. For 1976 it was estimated that these domestic imports totaled about 817,300 MT, and comprised the following types and quantities of commodities: manufacturing inputs 319,300 tons; agricultural inputs 7,800 tons; consumer goods 102,900 tons; and petroleum products 387,300 tons.

TABLE III-7
TRANSIT TRAFFIC

	1976	1983	1993	2003
		(000 MT)		
Total Transit Traffic-Ports of Lattakia and Tartous	353.4	605.0	1,084.0	1,683.0
Assigned to the Lattakia-Ariha Road (10% of above total)	35.3	60.5	108.4	168.3
Annual Average Growth Rates - Percent	8.0	6.0	4.5	

Zone domestic imports are projected on the basis of each of the major categories which make up this group. The annual average projected growth rates for each of the categories and for the group as a whole are shown in Table III.8.

TABLE III-8
ANNUAL AVERAGE GROWTH RATE FOR IMPORTS

Category	1976-1983	1984-1993	1994-2003
		(Percent)	
Consumer Goods	2.8	2.7	2.5
Manufacturing Inputs	7.5	7.3	6.0
Agricultural Inputs	9.0	9.0	5.0
Petroleum Products	10.0	8.5	7.0
Weighted Average	8.3	7.7	6.4

The projections of zone domestic imports in tons are shown to range from 55,000 tons for agricultural inputs (fertilizer) in 2003 to 3,357,000 tons for petroleum products in the same year, as shown in Table III-9.

TABLE III-9
ZONE DOMESTIC IMPORT PROJECTIONS

	1976	1983	1993	2003
		(000 MT)		
Consumer Goods	102.9	124.8	163.0	208.7
Manufacturing Inputs	319.3	529.7	1,071.6	1,919.0
Agricultural Inputs	7.8	14.3	33.8	55.0
Petroleum Products	387.3	754.7	1,706.4	3,356.8
Total	817.3	1,423.5	2,974.8	5,539.5

Summary of Economic Sector Projections

A summary of the economic sector projections for the Lattakia-Ariha zone of influence are shown in Table III-10. Total tonnage is expected to increase from about 5,163,000 tons in 1976 to about 29,158,000 tons by the year 2003. This amounts to an annual average growth rate of 6.6 percent.

TABLE III-10
SUMMARY OF ECONOMIC SECTOR PROJECTIONS

Economic Sector	1976	1983	1993	2003
		(000 MT)		
Agriculture (Marketable Surplus)	164.4	306.4	631.5	1,242.2
Industry	2,523.1	4,971.5	10,156.6	17,230.8
General Cargo (Exports and Imports)	1,622.6	2,346.0	3,626.7	4,976.8
Transit Traffic	35.3	60.5	108.4	168.3
Zone Domestic Imports	817.3	1,423.5	2,974.8	5,539.5
Total	5,162.7	9,107.9	17,498.0	29,157.6

Conversion of the projected economic sector tonnages of the Lattakia-Ariha zone traffic (ADT) on the basis of average cargo truck weights obtained from the 1978 O&D study of the Lattakia-Tartous road gives the results shown in Table III-11.

TABLE III-11
PROJECTED ADT OF ECONOMIC SECTORS

	1976	1983	1993 (ADT)	2003	Average Cargo Weight per Truck (Tons)
Agriculture (Marketable Surplus)	81	150	309	608	5.6
Industry	346	681	1,391	2,361	20.0
General Cargo (Exports and Imports)	211	305	471	646	21.1
Transit Traffic	5	8	14	22	21.1
Imports	168	294	613	1,142	13.3
Total	811	1,438	2,798	4,779	

Passenger Traffic

The weighted average daily passenger traffic for the entire length of the Lattakia-Ariha road was 518 vehicles according to the traffic survey conducted by the consultants in May, 1978. The ADT by vehicle type was as follows:

Cars -	210
Taxis -	156
Buses -	152
Total	518

Historical ADT data are not available from which trends could be calculated for passenger traffic so as to give some indication of future traffic growth. In lieu of such data, the consultant has utilized with some modification the transport demand factor calculated for the Lattakia-Tartous road. This factor was adapted from the relationship of the historical growth of passenger traffic to population for the Homs-Tartous road and applied to the Lattakia-Tartous road since the traffic and zone characterisitcs are similar. In view of the larger percentage of the rural population in the Lattakia-Ariha zone as compared with the Lattakia-Tartous and Lattakia-Homs

areas, the consultant has reduced the transport demand factors as shown in Table III-12.

TABLE III-12
TRANSPORT DEMAND FACTOR

	Lattakia-Tartous	Lattakia-Ariha
1976-1983	3.31	3.00
1984-1993	2.95	2.75
1994-2003	2.55	2.40

The application of the transport demand factor to the projected population growth rates for the Lattakia-Ariha road gives an estimated annual average growth rates for cars and buses for the 1976-2003 period, as shown in Table III-13.

TABLE III-13
CAR AND BUS GROWTH RATE

Period	Transport Demand Factor	Annual Average Population Growth Rate	Annual Average Normal Passenger Growth Rate
1976-1983	3.00	2.8	8.4
1984-1993	2.75	2.7	7.4
1994-2003	2.40	2.5	6.0

Tourism

There are no new tourism facilities scheduled for development under the National Tourism Plan at sites within the defined boundaries of the Lattakia-Ariha zone of influence. The extensive development of new facilities near the beaches in the zone of influence of the Lattakia-Tartous and Lattakia-Kassab roads will, however, stimulate tourism traffic originating within the Lattakia-Ariha zone as well as traffic passing through the zone, especially from the heavily-populated Aleppo area. In discussions with tourism officials and other knowledgeable persons associated with the tourism

tourism industry, about 30 percent of the tourism traffic in the Lattakia-Tartous areas originates in the Idlib and Aleppo areas. Projections of tourism traffic for the Lattakia-Ariha road is thus based upon a percentage of the projected number of tourists associated with the new tourism facilities being constructed or planned for construction in the Lattakia-Tartous areas. Existing tourism and its normal growth is already included in the projections of passenger traffic and are thus excluded from these calculations.

TABLE III-14
TOURISM-ADT

	Projected ADT for New Tourism Facilities Lattakia-Tartous Area			Tourism ADT Assigned to the Lattakia-Ariha Road 1/		
	Cars	Buses	Total	Cars	Buses	Total
1983	264	48	312	79	14	93
1993	1,101	200	1,301 2/	330	60	390 2/
2003	2,158	372	2,530 2/	648	112	760 2/

1/ 30 percent of the ADT of Lattakia-Tartous.

2/ Accumulative total.

SUMMARY OF PROJECTED AVERAGE DAILY TRAFFIC BY TYPE OF VEHICLE

The previous projections of tonnages by economic sector and passenger traffic, including new tourism traffic, translate into ADT's as shown in Table III-15 for the projected periods 1983, 1993, and 2003. The projected annual average growth rates by type of vehicular traffic are shown in Table III-16.

TABLE III-15
PROJECTED ADT FOR THE LATTAKIA-ARIHA
IMPROVED ROAD BY TYPE OF VEHICLE 1976-2003

	1976	1983	1993	2003
Cars 1/	323 2/	646	1,488	2,722
Buses 1/	135 2/	250	542	975
Trucks	811	1,438	2,798	4,779
Total	1,269	2,334	4,828	8,476

1/ Includes normal passenger traffic plus tourism traffic assigned from new facilities in the Lattakia-Tartous area.

2/ Adjusted from May, 1978 to December 31, 1976 on basis of projected growth rate.

TABLE III-16
PROJECTED ANNUAL AVERAGE GROWTH
RATES OF ADT BY TYPE OF VEHICLE

	1976-1983	1984-1993	1994-2003
		(Percent)	
Cars	10.5	8.7	6.2
Buses	9.2	8.1	6.1
Trucks	9.1	6.9	5.5
Weighted Average	9.1	7.5	5.8

Part IV

ENGINEERING

E N G I N E E R I N G

INTRODUCTION

This chapter of the report has been divided into six basic sections. First, the project corridor is generally described noting salient engineering features which govern the alignment selection. A section devoted to the transportation analysis follows. The transportation analysis employs the growth figures developed in the economics section of the report to forecast the amount, location and composition of traffic that will use the proposed facility. The third section describes the type of facility that will be required to meet the traffic demands developed in the transportation analysis. A fourth section contains a geotechnical description of the route corridor. A narrative description of the recommended route alignment, including a discussion of limiting factors, is the subject of the fifth section. The sixth and last section analyzes the economics of alternative route locations by segment.

The geographic locations referred to in this chapter of the report may be found on the Plates in Part VI Recommended Geometrics.

ROUTE CORRIDOR

From the city of Lattakia the project corridor runs northeasterly for 15 km. along the broad valley of Al Kabir Al Shamaly River across the coastal plain, then follows the narrowing river valley flanked by limestone hills for an additional 15 km., and then traverses about 30 km. of mountainous terrain sharply cut with narrow stream valleys. The corridor then drops sharply into the undulating Orontes valley, which is only a few kilometers wide. The corridor then rises and passes through limestone hills to the terminus at Ariha. Jisr esh Shugur is the only intermediate city with major significance in transportation planning.

At the western terminus of the proposed highway is the city of Lattakia, Syria's largest seaport city with a population estimated at 120,000 in 1976. The eastern end of the proposed project is not a terminus, but rather a connection to an existing four-lane highway network linking Ariha (at present) with Aleppo and other major cities of the interior. A primary service of the proposed facility will be to expedite flow of agricultural exports from the interior to the port of Lattakia. The route will also facilitate the reverse flow of imports into the interior.

There is an existing railway in the corridor. The railroad and terrain provide the primary physical constraints upon route selection. Economy of construction and economy of use are the two remaining factors which significantly control alignment selection within the corridor.

TRANSPORT ANALYSIS

Traffic Volumes

Traffic data for the route was obtained and analyzed from a traffic count survey conducted at three locations along the route. In addition, an origin-destination survey was conducted to supplement and establish data considered necessary for the analysis.

1. Traffic Survey

   a. General

Subsequent to a field reconnaissance and discussions with other project personnel of their needs, a traffic count program was established to represent the project by three road segments: Lattakia to Haffe/Slenfe Road Junction (KM 137±); Haffe/Slenfe Road Junction to Jisr esh Shugur (KM 162): and Jisr esh Shugur to Ariha (KM 198). The traffic count stations were located along the existing road at 16.3, 41.0, and 76.0 kilometers from the junction and

beginning terminus with the route between Tartous and Lattakia. Traffic counts were started at 6:00 a.m. on Monday, the 29 of May and continued for 72 hours ending at 6:00 a.m. Thursday, 1 June 1978.

b. Results

(1) Daily

Traffic counts were reviewed for accuracy and are presented as a total for both directions inTable IV-1 for the three road segments by various vehicle types.

TABLE IV-1

1978 TRAFFIC BY SEGMENT
LATTAKIA-ARIHA ROUTE

	Lattakia-Haffe/Slenfe Road Junction	Haffe/Slenfe Road Juntion-Jisr esh Shugur	Jisr esh Shugur-Ariha
Passenger Car	202	183	241
Taxi	142	115	207
Pick up Truck	249	182	457
Micro Bus	165	72	78
Bus	41	24	42
Truck, 2 axle	606	560	554
Truck, 3 axle	28	21	45
Truck Trailer	29	30	35
Tractor semi trailer	72	74	74
Sub Total	1534	1261	1733
Motorcycle	112	30	130
Farm Tractor	52	16	75
Sub Total	164	46	205
Non Motorized	8	8	12
GRAND TOTAL	1706	1315	1950

(a) Lattakia to Haffe/Slenfe Road Junction

Traffic volumes on this segment of the route were an average daily volume of 1534 large motorized vehicles. These consisted of 593 vehicles or 39 percent cars, taxis, and pick up trucks; 206 vehicles or 13 percent micro buses and buses; and 735 vehicles or 48 percent trucks. This segment also had 164 motorcycles and farm tractors and eight non-motorized vehicles.

(b) Haffe/Slenfe Road Junction to Jisr esh Shugur

There were a total 1261 large motorized vehicles on this road segment of which 480 vehicles or 38 percent were sedans, taxis, and pick up trucks; 96 vehicles or eight percent micro buses and buses; and 685 vehicles or 54 percent trucks. In addition, there were 46 combined motorcycles and farm tractors and eight non-motorized vehicles.

(c) Jisr esh Shugur to Ariha

There were a total 1733 large motorized vehicles on this road segment of which 905 vehicles or 52 percent were sedans, taxis, and pick up trucks; 120 vehicles or seven percent buses; and 708 vehicles or 41 percent trucks. In addition, there were 205 combined motorcycles and farm tractors and 12 non-motorized vehicles.

(2) Hourly

Average hourly percents were established from the traffic count data and are presented in tabular form in Table IV-2 and graphically as Figures IV-1, IV-2 and IV-3 for the three respective segments. It is noted that traffic during the 16 daytime hours between 5:00 a.m. and 9:00 p.m. comprise 91.9 percent, 88.4 percent, and 84.2 percent of the three respective segments. The relative difference in the segments is because traffic is moving westward from Aleppo, having started quite early and crossing the count

stations at varying times. From survey data, the majority of vehicles at the early hours were empty petroleum vehicles going to Lattakia.

TABLE IV-2

Hourly Traffic Volumes, By Segment
As Percent of Daily
6:00 a.m. 29 May - 6:00 a.m. 31 May 1978

	Lattakia - Haffe/Slenfe Road Junction		Haffe/Slenfe Road Junction - Jisr esh Shugur		Jisr esh Shugur - Ariha	
	Percents		Percents		Percents	
Hours	Hourly	Cumulative	Hourly	Cumulative	Hourly	Cumulative
00-01	0.7	0.7	0.8	0.8	0.9	0.9
01-02	0.5	1.2	0.5	1.3	0.7	1.6
02-03	0.5	1.7	0.9	2.2	0.6	2.2
03-04	0.6	2.3	0.5	2.7	2.0	4.2
04-05	1.5	3.8	2.5	5.2	6.0	10.2
05-06	5.9	9.7	7.5	12.7	7.8	18.0
06-07	9.1	18.8	8.5	21.2	6.6	24.6
07-08	6.8	25.6	5.3	26.5	6.4	31.0
08-09	4.7	30.3	3.7	30.2	5.3	36.3
09-10	5.9	36.2	4.4	34.6	5.6	41.9
10-11	5.9	42.1	5.6	40.2	4.7	46.6
11-12	5.8	47.9	5.7	45.9	6.6	53.2
12-13	5.4	53.3	6.2	52.1	5.8	59.0
13-14	7.5	60.8	5.2	57.3	6.0	65.0
14-15	5.9	66.7	7.5	64.8	4.9	69.9
15-16	6.4	73.1	6.3	71.1	6.0	75.9
16-17	5.3	78.4	4.9	76.0	5.2	81.1
17-18	4.7	83.1	5.0	81.0	4.2	85.3
18-19	4.6	87.7	4.2	85.2	3.6	88.9
19-20	4.3	92.0	4.3	89.5	2.9	91.8
20-21	3.7	95.7	4.1	93.6	2.6	94.4
21-22	1.5	97.2	2.7	96.3	2.3	96.7
22-23	1.6	98.8	2.3	98.6	1.8	98.5
23-24	1.2	100.0	1.4	100.0	1.5	100.0

FIGURE IV-1
TRAFFIC ANALYSIS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION

HOURLY PERCENTS

HOURLY CUMULATIVE

MAY 1978

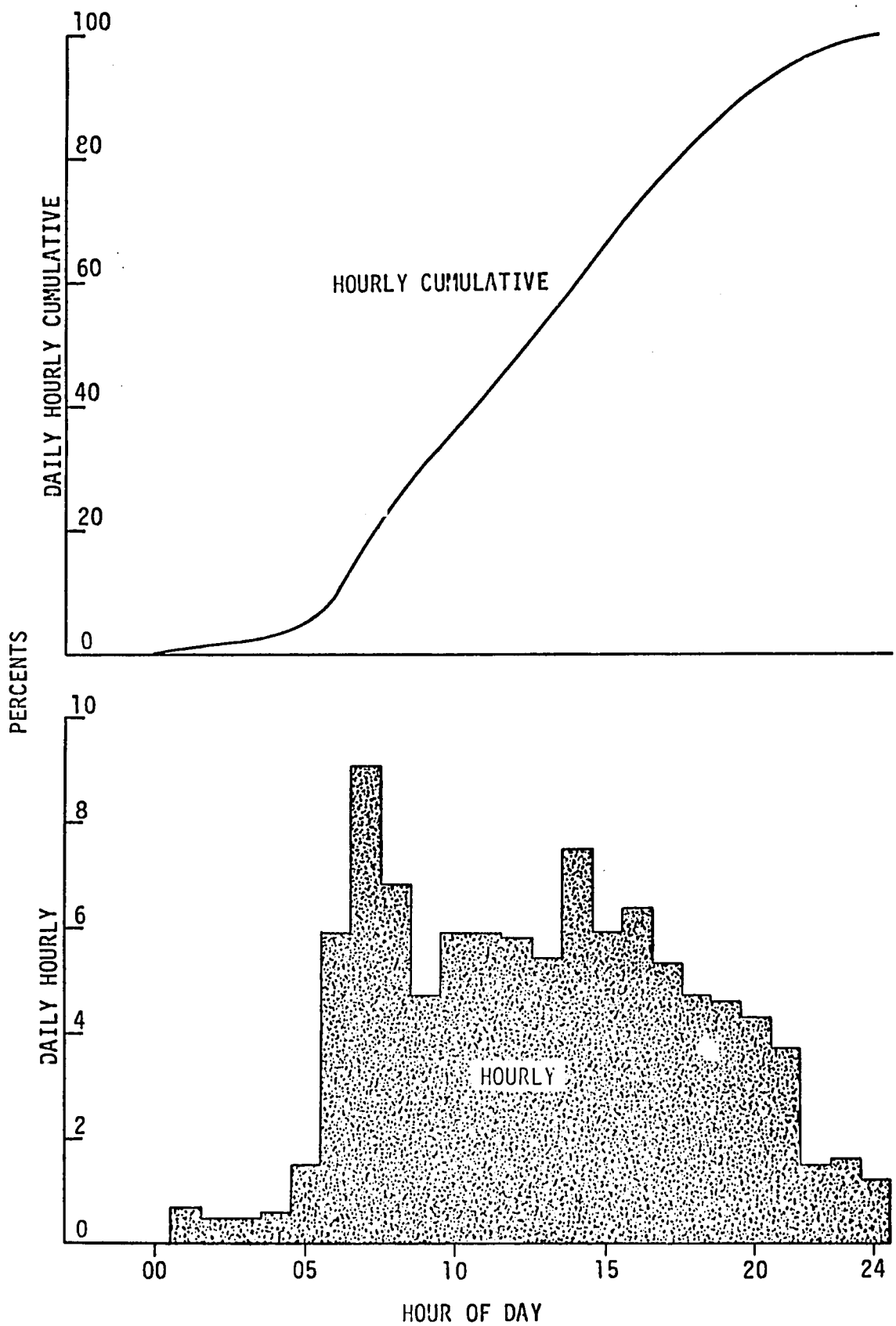


FIGURE IV-2
TRAFFIC ANALYSIS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR

HOURLY PERCENTS

HOURLY CUMULATIVE

MAY 1978

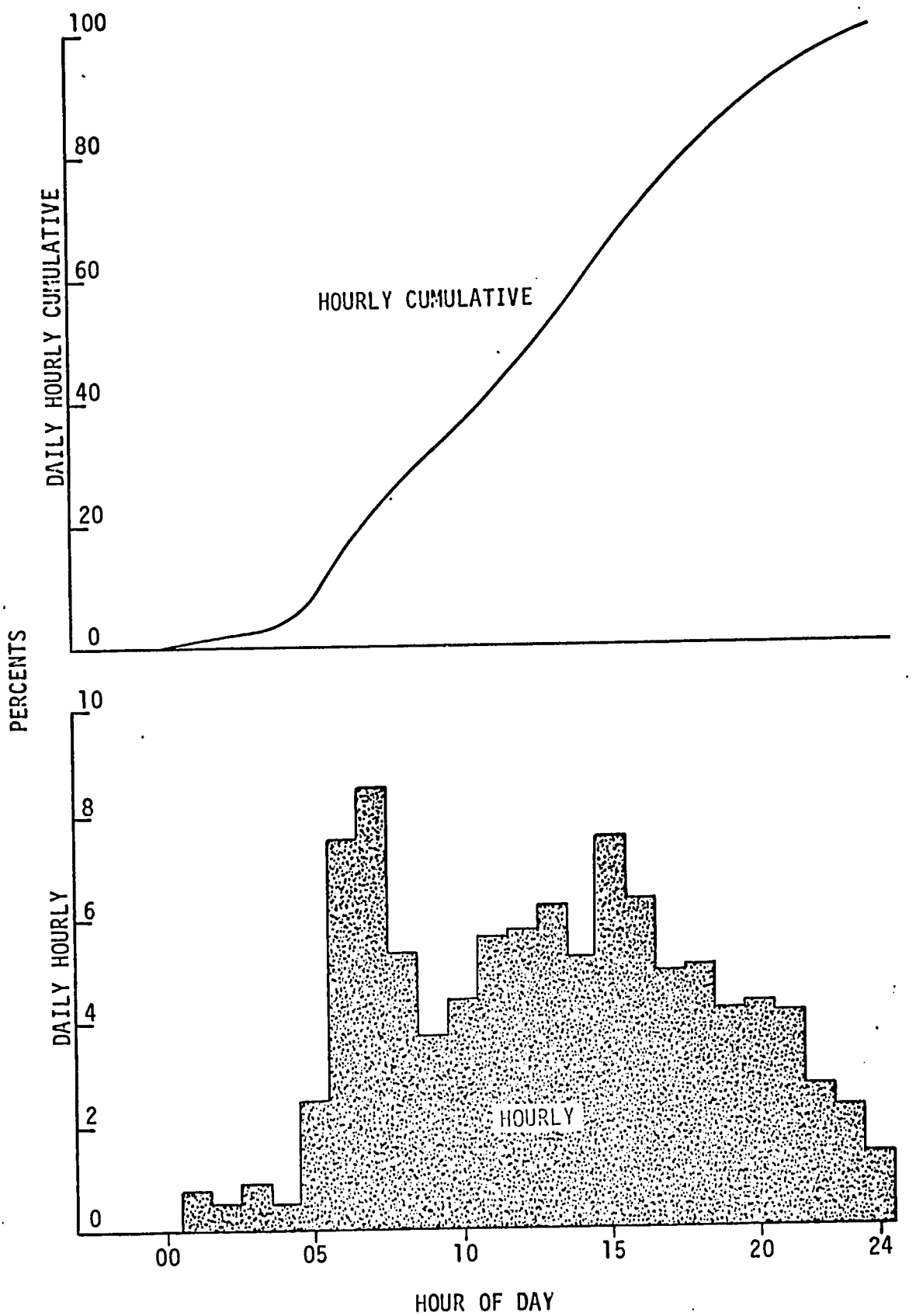
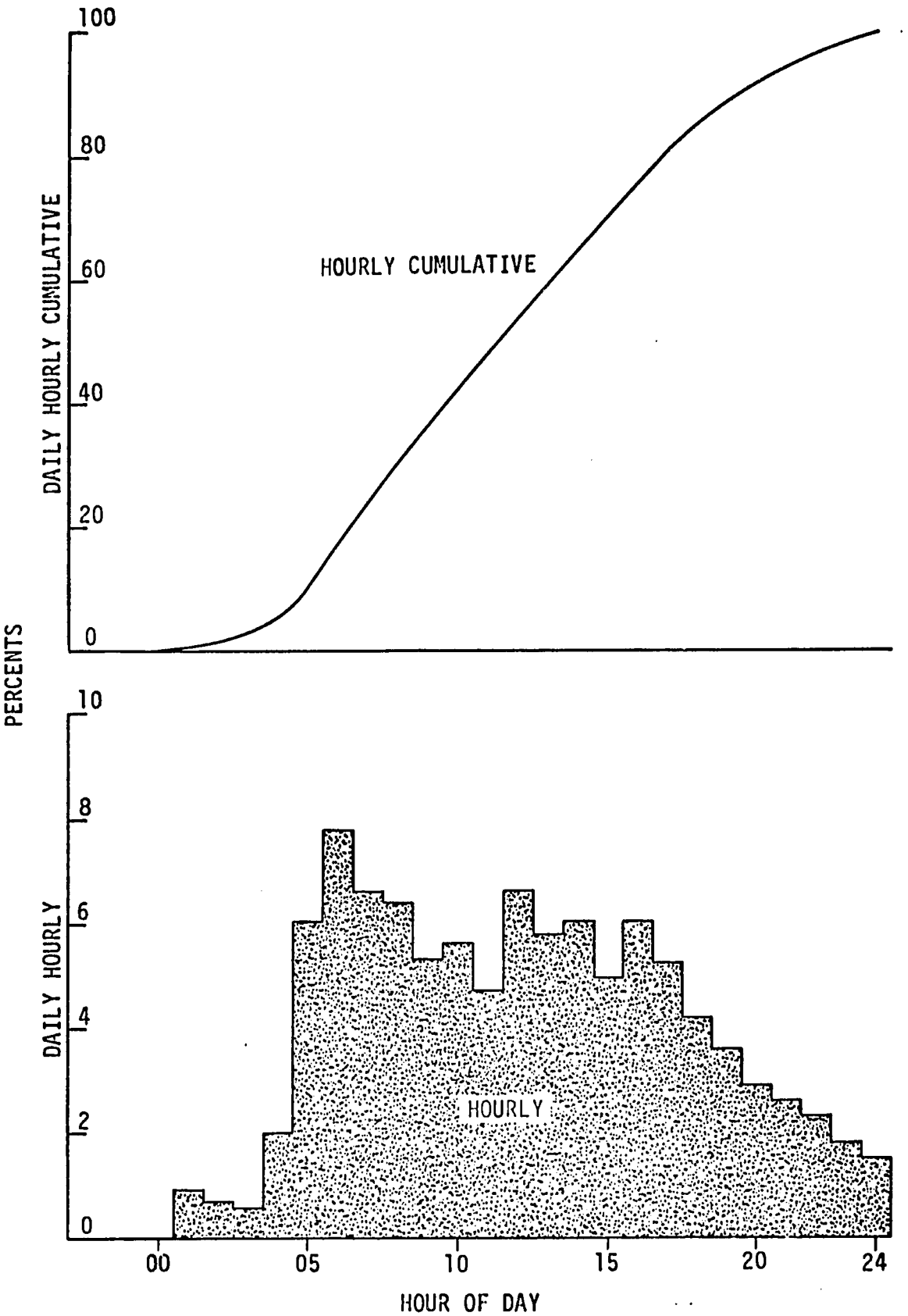


FIGURE IV-3
TRAFFIC ANALYSIS
JISR ESH SHUGUR - ARIHA

HOURLY PERCENTS

HOURLY CUMULATIVE

MAY 1978



The peak hour varied with traffic moving westerly. The segment closest to Ariha had a 7.8 percent peak hour between 5:00 a.m. - 6:00 a.m. The segment from Haffe/Slenfe to Jisr esh Shugur had an 8.5 percent peak hour between 6:00 and 7:00 a.m. and the segment from Lattakia to Hafe/Slenfe had a 9.1 percent peak hour also between 6:00 and 7:00 a.m.

2. Origin-Destination Survey

a. General

In addition to the traffic count surveys, it was also decided to conduct an origin-destination survey to provide specific data for the route. After reviewing the route for possible study site locations, and determining the type of data needed by the project economists, a study location was established along with the traffic count station, approximately 41.0 km. from Lattakia, between Jisr esh Shugur and Lattakia. This location would offer data on long distance travel between Aleppo and Lattakia and travel data on trips between Jisr esh Shugur and Lattakia, however, it would exclude trip data between Ariha and Jisr esh Shugur. In addition, the survey was to provide data for assigning traffic to the bypass route around Jisr esh Shugur.

b. Results

The most important data established by the survey is the direction of truck movements and loadings; origin and destination to establish bypass traffic at Jisr esh Shugur, and passenger movements. This report presents such results as a minimum; however, based upon need, considerable other tables and data are readily available.

(1) Truck Movements

The Origin-Destination survey obtained data on truck loading characteristics which were used in the determination of climbing lanes at each survey station. The data presented herewith has been based upon an analysis of the four large truck types (excluding pick-up trucks) and movements in both directions.

A total 480 trucks surveyed in the westbound direction and it was found that 350 trucks or 73 percent of the trucks going to Lattakia were empty while 130 trucks or 27 percent were carrying loads. A total 688 trucks surveyed in the eastbound direction, and it was found that 614 trucks or 89 percent had loads while 74 trucks or 11 percent were empty. Details of the analysis are shown in Table IV-3.

TABLE IV-3
TRUCK LOADING ANALYSIS
DIRECTIONAL FLOWS

May 1978

	Total Surveyed	Empty	With Loads	Percent Empty	Percent With Loads
Westbound					
2 axle Truck	378	271	107	72%	28%
3 axle Truck	13	8	5	62%	38%
Truck plus Trailer	28	24	4	86%	14%
Tractor plus ½ Trailer	61	47	14	77%	23%
Total	480	350	130	73%	27%
Eastbound					
2 axle truck	573	67	506	12%	88%
3 axle truck	16	2	14	12%	88%
Truck plus trailer	32	1	31	3%	97%
Tractor plus ½ Trailer	67	4	63	6%	94%
Total	688	74	614	11%	89%

(2) Truck Loadings

One of the items required by the project economists was truck loadings which would be utilized for truck cargo projections. It must be emphasized that the data noted relative to loads carried was not verified since scales were not available to weigh vehicles at the survey stations. The data recorded was that orally given by truck drivers, and undoubtedly in some instances, reflects legal loadings in order to show compliance with the law. In this respect, it would be anticipated the data most likely is understated and does not necessarily reflect actual truck weights. Details of findings are noted in Table IV-4. These findings are approximately similar to those found at the scales at the port of Lattakia; however, in all instances they are somewhat lower than the scale data which is attributed to the oral answer rather than to the actual weight.

TABLE IV-4

AVERAGE CARGO WEIGHT
BOTH DIRECTIONS
(TONS)

	Type of Truck				
Cargo Type	2 Axles	3 Axles	Truck Trailer	Tractor Half-Trailer	Weighted Average
Container	14.3	0.0	23.0	24.8	19.8
Construction	12.2	18.0	31.0	45.0	14.7
Fruit & Vegetables	5.8	13.0	28.0	35.0	6.7
Industry	10.2	9.3	27.0	24.8	14.0
Livestock	1.7	0.0	35.0	0.0	3.2
General Merchandise	9.1	21.6	27.7	36.0	14.4
Bulkgoods	13.7	0.0	32.7	33.9	22.8
Petroleum Products	13.2	16.3	36.0	26.8	14.9
Forestry	16.3	0.0	0.0	28.0	19.3
TOTAL	10.6	17.0	29.2	29.5	13.7

While four types of trucks are used for hauling goods, the predominance of the two axle truck can be noted by the overall weighted average of 13.7 tons for all trucks which is slightly greater than the 10.6 tons for the two axle truck. It is noted the truck trailer and tractor half trailers carry approximately three times the load of the two axle truck.

(3) Selected Origin-Destination Data

The total survey results were reviewed and the more significant results presented in Table IV-5 for the westbound and eastbound movements.

From the westbound movements, it is noted that the largest number of vehicles with goods, 45 percent, are moving from Aleppo to Lattakia with the next highest volume, 22 percent, moving from Jisr esh Shugur to Lattakia. The highest tonnage of goods moved, 51 percent, are from Aleppo to Lattakia with the next highest volume of goods moved, 20 percent, from Homs to Lattakia. Fifteen percent of the goods moved are from Jisr esh Shugur to Lattakia. The largest volume of empty truck movements, 49 percent, are from Aleppo to Lattakia while 19 percent of the empty trucks go from Jisr esh Shugur to Lattakia. The largest number of passenger vehicles, 67 percent, and occupants, 61 percent, go from Aleppo to Lattakia while 24 percent of the passenger vehicles and 34 percent of the occupants go from Jisr esh Shugur to Lattakia.

For the eastbound movements it is noted that the largest truck movement with goods, 45 percent, is from Lattakia to Aleppo while 15 percent of the trucks with goods go from Banyas to Aleppo. The tonnages of goods moved are also reflected in these same movements in that the highest volumes moved, 45 percent, are from Lattakia to Aleppo with 16 percent of the total tons moved from Banyas to Aleppo. For empty trucks, 42 percent are moving from Lattakia to Aleppo and 37 percent from Lattakia to Jisr esh Shugur.

Fifty-seven percent of the passenger vehicles and 48 percent of the occupant numbers are moving from Lattakia to Aleppo while 32 percent of the passenger vehicles and 47 percent of the occupants are moving between Lattakia and Jisr esh Shugur.

It should be noted that a detailed survey was not conducted of the passenger occupants in each passenger vehicle and therefore, the results of the survey reflect the origin and destination of the vehicle and not necessarily the ultimate destination of the occupants.

TABLE IV-5

ORIGIN-DESTINATION RESULTS
SELECTED DATA
VEHICLES, TONS, AND PASSENGER MOVEMENTS

	TRUCKS						PASSENGERS			
	Volumes with Goods		Tons of Goods		Empty Volumes		Vehicles		Occupants	
Westbound	#	%	#	%	#	%	#	%	#	%
Homes to Lattakia	17	9	301	20	16	3	3	1	6	-
Aleppo to Lattakia	83	45	762	51	246	49	269	67	1948	61
Jisr esh Shugur to Lattakia	41	22	228	15	97	19	98	24	1098	34
Ariha to Lattakia	8	4	8	1	22	4	3	1	18	1
Idlib to Lattakia	12	7	43	3	33	7	4	1	12	-
Aleppo to Banyas	8	4	66	4	42	8	2	1	8	-
Sub-Total	169	91	1408	94	456	90	379	95	3090	96
Total Surveyed	184	100	1494	100	498	100	401	100	3188	100
Eastbound										
Lattakia to Homs	36	5	618	7	6	3	1	-	2	-
Lattakia to Aleppo	299	45	4026	45	75	42	229	57	1788	48
Lattakia to Deir ez Zor	34	5	710	8	0	-	2	1	4	-
Lattakia to Jisr esh Shugur	54	8	309	3	66	37	127	32	1756	47
Lattakia to Ariha	13	2	58	1	4	2	1	-	2	-
Lattakia to Idlib	26	4	292	3	11	6	8	2	38	1
Jebleh to Aleppo	19	3	185	2	0	-	2	1	4	-
Banyas to Aleppo	102	15	1402	16	2	1	1	-	2	-
Banyas to Deir ez Zor	29	4	538	6	0	-	0	-	0	-
Banyas to Idlib	14	2	197	2	1	1	0	-	0	-
Sub-Total	626	93	8335	93	165	92	371	93	3596	96
Total Surveyed	671	100	8852	100	177	100	400	100	3746	100

The survey data were also distributed between the larger trucks and pick up trucks with results shown in Table IV-6. Empty vehicles predominate the westbound movement while vehicles with goods predominate the eastbound flow.

TABLE IV-6

TRUCK CATEGORIES AND VOLUMES
WITH GOODS/EMPTY

	Pick Up Trucks	Percent	Large Trucks	Percent
Westbound				
With Goods	54	26.7%	130	27.1%
Empty	148	73.3%	350	72.9%
Total	202	100.0%	480	100.0%
Eastbound				
With Goods	57	35.6%	614	89.2%
Empty	103	64.4%	74	10.8%
Total	160	100.0%	688	100.0%

3. Jisr esh Shugur

Between Lattakia and Ariha there is one major city, Jisr esh Shugur, located approximately 70 km. east of Lattakia. East of the city is a sugar beet factory which is the largest plant in the area generating considerable local traffic. During heavy rains, the bridge at the east end of the city and on the route under study, is overtopped by floodwaters. In order to remove the through traffic from the slower local traffic and the delays encountered with flooding, it was considered necessary to establish a bypass around the city.

The origin-destination survey included a specific question to establish volumes which would bypass the city of Jisr esh Shugur with results shown in Table IV-7.

TABLE IV-7

ORIGIN DESTINATION SURVEY RESULTS
JISR ESH SHUGUR BYPASS

Vehicle Type	Percent Having Jisr esh Shugur as Terminal	Percent Wanting To Bypass Jisr esh Shugur	Volumes Assigned To Bypass
Passenger Car	9	91	167
Taxi	24	76	87
Pick up Truck	33	67	120
Micro Bus	81	19	15
Bus	49	51	12
Truck, 2 axle	14	86	480
Truck, 3 axle	10	90	19
Truck trailer	20	80	24
Tractor, semi trailer	4	96	71
Total	-	-	995

Truck Loading Practices

1. Present Situation

a. General

No previous study of truck weights and load distribution in Syria exists. Therefore, the Consultant found it necessary to conduct such a study in order to relate traffic volume to tonnage in transit (for economic studies) and to determine equivalent axle loads (for pavement design studies). For purposes of the study the Consultant's personnel were granted permission (and the security clearances necessary) to utilize two scales of 30 metric ton

capacity, all of which are permanent installations within the Port of Lattakia. In addition to the above mentioned scales, privately owned scales of 60 metric ton capacity, located near the port entrance, were used to weigh vehicles which could not be accommodated by the scales in the port.

b. Truck Load Survey

(1) Weighing Procedures

The normal port weighing procedures yielded data that was used without modification. Single unit trucks were weighed as a unit while varying procedures were required for truck combinations. For truck and trailer with load known not to exceed 50 tons (at the port scale) or 60 tons (at the private scale) the entire combination was weighed as one unit. When the load was questionable, the truck was first driven onto the scale (and a weight recorded), and then driven off the scale to enable the trailer to be weighed. The combined weights were the accepted weight with one weigh ticket showing all information. Acceptance of weights for tractor and semi-trailer combinations require this vehicle to be weighed as one unit. When the weight was known to be less than 50 metric tons, that vehicle was weighed as one unit at the port scale. For loads exceeding 50 tons, the driver would normally go to the private scales of 60 ton capacity.

Several situations were observed with extra heavy or extra wide loads involved. In one instance noted, a tractor semi-trailer of more than 50 tons was turned away from the port scale and went to the private scale where the recorded weight was 58 tons. The Consultant did not observe any tractor semi-trailer combination weights exceeding 60 metric tons; however, the team did observe several truck-trailer combinations with total loads exceeding 60 metric tons. In several instances loads were to wide to fit the

configuration of the scale and weigh house, and in such cases the net weight noted on the goods was used as the basis for documentation.

Because of the wide variations in types and loads of trucks, the Consultant elected to analyze truck data in six categories:

2 axle trucks, medium
2 axle trucks, large
3 axle trucks
2 axle truck and trailer combinations
4 axle combinations, tractor and semi-trailer (2-S2)
5 axle combinations, tractor and semi-trailer (3-S2)

A differentiation was made between two axle trucks of large and medium sizes because of their great range of weights. The medium two-axle truck was described as having an average loaded weight approximately 60 percent of that carried by the larger two axle truck.

(2) Findings

(a) Vehicle Weights

The range of observed vehicle weights by vehicle type is presented in Table IV-8. The numbers of vehicles included in the study are shown by vehicle type and weight in Appendix Tables 1 and 2. Figures IV-4 and IV-5 show the cumulative percents of the increasing weights with loads and empty weights respectively for each of the six truck types.

TABLE IV-8
TRUCK LOADINGS
RANGE OF WEIGHTS
METRIC TONS
PORT OF LATTAKIA, FEBRUARY 1978

Vehicle Type	Empty		With Load	
	Low	High	Low	High
Single Unit Trucks				
2 axle truck, medium	2.51	7.50	6.51	20.50
2 axle truck, large	7.51	11.50	19.51	30.50
3 axle truck	10.51	19.50	28.51	44.50
Combination Vehicles				
Truck + Trailer	12.51	19.50	41.51	64.50
4 axle combination	11.51	20.50	25.51	60.50
5 axle combination	14.51	21.50	40.51	57.50

(b) Average Loads

Although the data reflects weights for vehicles loaded and empty, it was not possible during the course of the study to systematically weigh specific vehicles in both the loaded and empty condition to determine true net load. Average loads for each vehicle type have therefore been determined by subtracting the average empty weight for any given vehicle type from the average loaded weight for the type. The results of this analysis are shown in Table IV-9.

(3) Axle Distribution

For the study and design of the pavement, it is desirable to have axle load data which is converted to a number of standard axle loads by use of equivalency factors. These factors relate given axle loadings to a standard 8.2 metric ton (18,000 lb.) single axle load and include both single and tandem axles since these axle types have differing effects upon the pavement.

FIGURE IV-4
TRUCK WEIGHTS WITH LOADS
CUMULATIVE PERCENTS

PORT OF LATTAKIA, FEBRUARY 1978

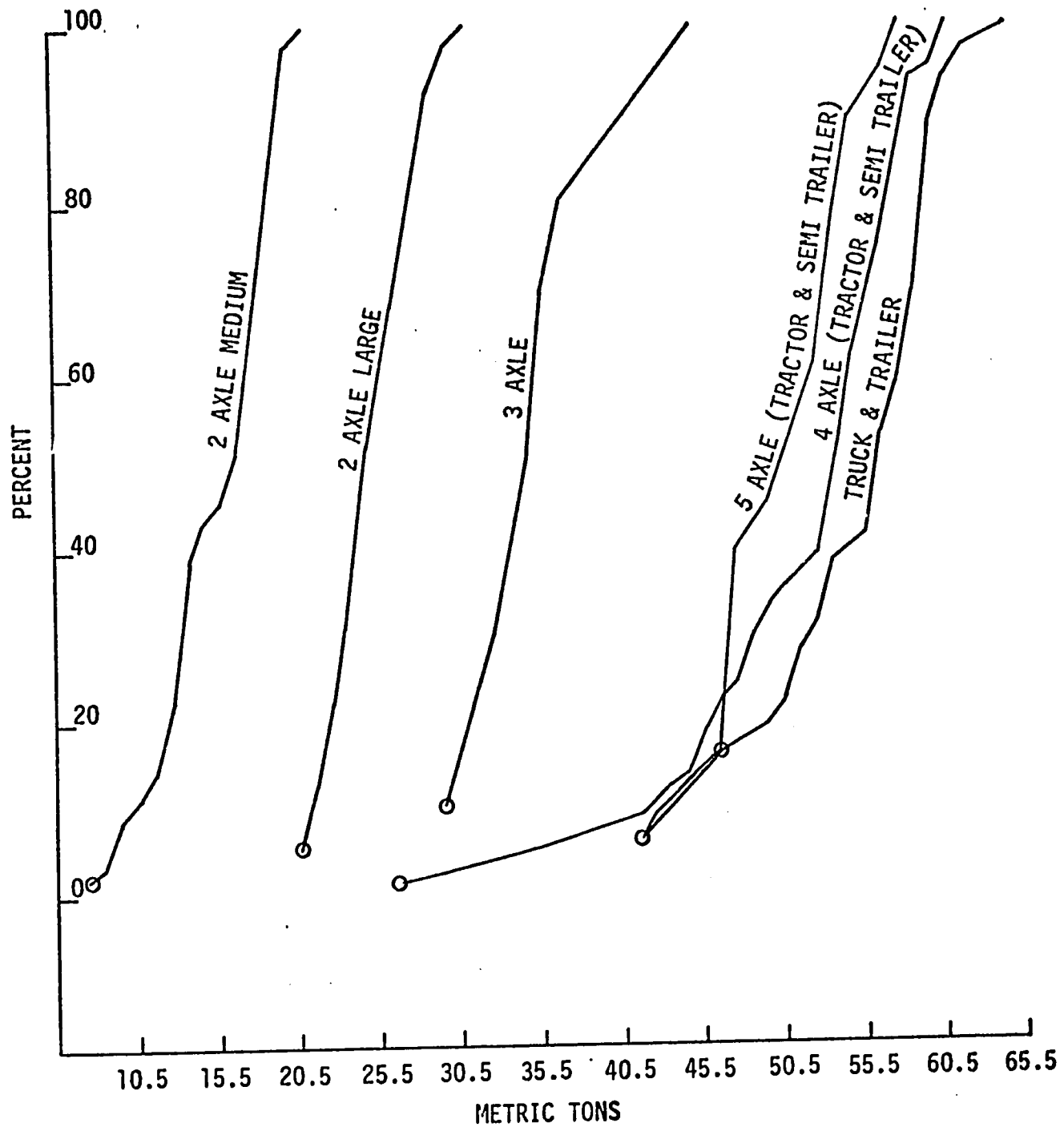


FIGURE IV-5
TRUCK WEIGHTS EMPTY
CUMULATIVE PERCENTS

PORT OF LATTAKIA, FEBRUARY 1978

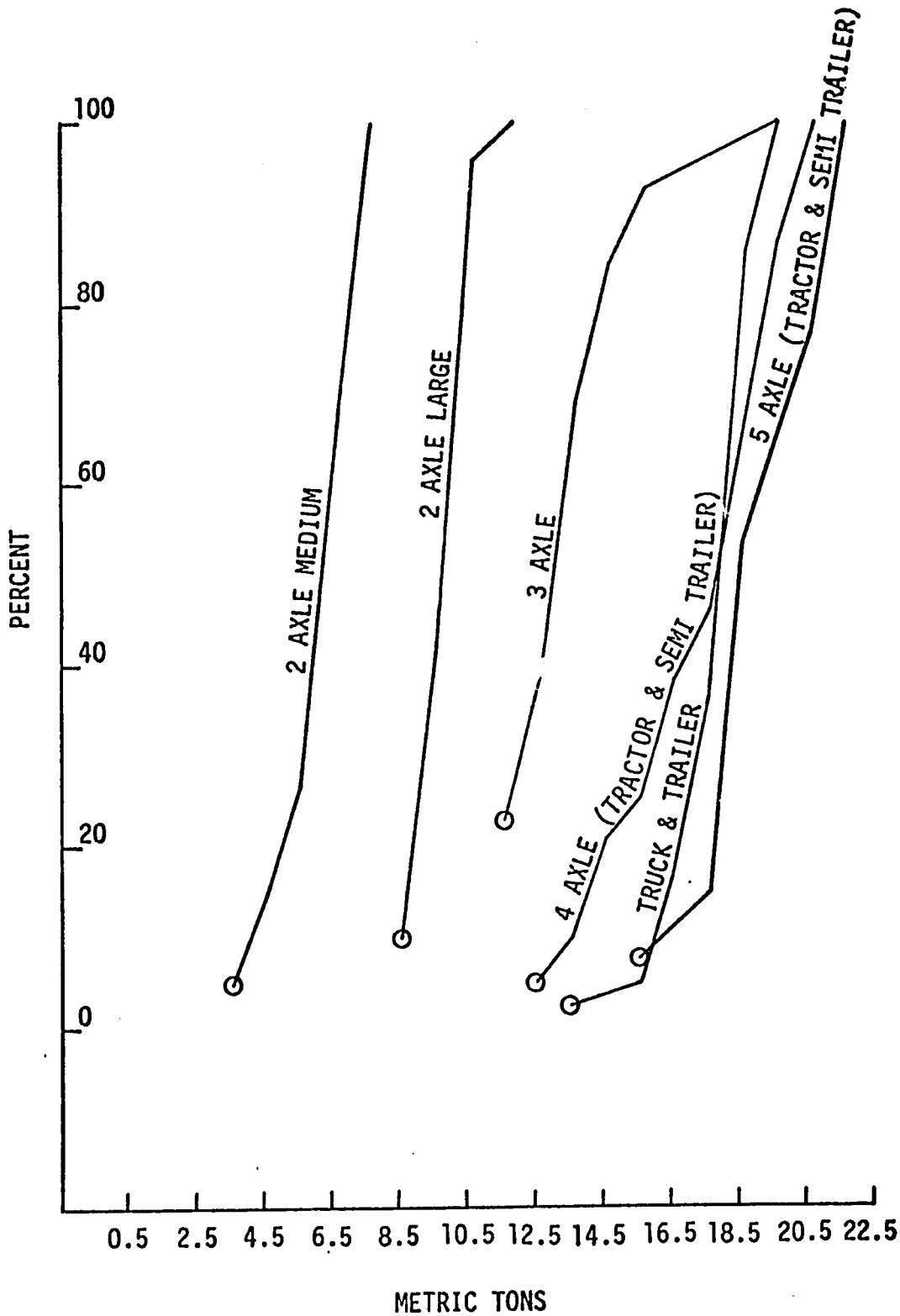


TABLE IV-9
TRUCK LOADINGS
AVERAGE WEIGHTS (kg)
PORT OF LATTAKIA, FEBRUARY 1978

Vehicle Type	Vehicles With Loads		Vehicles Without Loads		
	No. of Vehicles Weighed	Average Weight	No. of Vehicles Weighed	Average Weight	Average Load
2 axle truck					
Medium	106	15,080	100	5,800	9,280
Large	42	24,754	50	9,569	15,185
3 axle truck	10	34,907	13	13,134	21,773
2 axle truck & trailer	32	54,329	41	17,535	36,794
4 axle (tractor + semi trailer)	83	51,469	39	17,078	34,391
5 axle (tractor + semi trailer)	18	50,188	13	19,076	31,112

(a) Procedure

During the truck weigh survey at the Port in Lattakia, total loads rather than individual axle weights were obtained in order to continue the normal traffic flow. It was then necessary to establish a procedure to distribute loads to each axle since no such data existed for Syria. After searching the literature, a report[1/] was located containing data on axle load weighings in Abu Dhabi and Qatar. Because of the proximity of the areas it was considered reasonable to apply this study to local vehicle axle loadings.

1/ Axle Load Distribution on Roads Overseas, Abu Dhabi and Qatar 1970-1971, TRRL Report LR 572, Transport and Road Research Laboratory, Department of the Environment, U.K. 1973.

The published data contained individual axle loadings for both empty and loaded vehicles and was used as a basis to establish a percent of the vehicle weight to be distributed to each axle. For tandem axles, the percents of the two axles were combined. The findings were applied to Syria conditions for all main truck types except truck and full trailer combination for which it was necessary to establish an axle loading distribution. For this vehicle it was decided to use axle load factors for the two-axle, six tire truck and a fifty-fifty percent split for the axles on the full trailer.

This use of the data from out of the country was subsequently followed by a study of axle loadings reflecting local conditions. During June, 1978, a survey was conducted of individual axle loadings on scales located in Damascus and operated by the Ministry of Supply. In addition, results from a truck weigh survey conducted in the United States[1/] were reviewed. These three sets of axle load data are presented in Table IV-10. The comparison indicates that similar type trucks have similar load distribution characteristics regardless of differing size and empty weights. After reviewing the results of these studies and taking into consideration the size of the samples used, it was decided that the Abu Dhabi data is valid for the Syria situation.

The truck weight and trailer weight were separated in cases where the combination of trucks and full trailers were not weighed independently and an analyses made for empty and loaded situations. Of the 32 truck and trailer combinations with loads, 26 had weighings of the truck separate from the trailer while six were weighed as a complete unit. Of the 41 empty

1/ Truck Traffic Volume and Weight Data for 1971 and Their Evaluation, Report No. FHWA-RD-76-138, Federal Highway Administration, Washington, D.C., December 1976.

TABLE IV-10

AXLE LOAD DISTRIBUTION BY PERCENTAGE

Vehicle Type	Number of Vehicles Weighed	Axle Location Front	Next Type	%	Next Type	%	Next Type	%
Single Unit Vehicles								
2 axle, 6 tires								
Empty								
Abu Dhabi	1,011	44	Single	56	-	-	-	-
U.S.A.	7,964	44		56	-	-	-	-
Syria	42	46		54	-	-	-	-
Loaded								
Abu Dhabi	914	30	Single	70	-	-	-	-
U.S.A.	13,282	35		65	-	-	-	-
Syria	39	31		69	-	-	-	-
3 axle, 10 tires								
Empty								
Abu Dhabi	12	37	Tandem	63	-	-	-	-
U.S.A.	2,716	40		60	-	-	-	-
Syria	4	32		68	-	-	-	-
Loaded								
Abu Dhabi	17	24	Tandem	76	-	-	-	-
U.S.A.	3,073	28		72	-	-	-	-
Syria	3	34		66	-	-	-	-
Combination Vehicles								
Truck plus trailer								
Empty								
Abu Dhabi 1/	-	28	--	35	-	18.5	-	18.5
U.S.A.	-	-	--	-	-	-	-	-
Syria	19	27	Single	34	Single	20	Single	19
Loaded								
Abu Dhabi 1/	-	15	--	35	-	25	-	25
U.S.A.	-	-	--	-	-	-	-	-
Syria	6	15	--	34	-	26	-	25
Tractor plus 1/2 trailer (2 axle + 2 axle)								
Empty								
Abu Dhabi	6	24	Single	31	Tandem	45	-	-
U.S.A.	3,151	28	-	32	-	40	-	-
Syria	18	28	-	31	-	41	-	-
Loaded								
Abu Dhabi	18	13	-	31	-	56	-	-
U.S.A.	5,910	18	-	32	-	49	-	-
Syria	7	12	-	33	-	55	-	-
Tractor plus 1/2 trailer (3 axle _ 2 axle)								
Empty								
Abu Dhabi	18	21	Tandem	38	Tandem	41	-	-
U.S.A.	10,311	27	-	42	-	31	-	-
Syria	4	25	-	39	-	36	-	-
Loaded								
Abu Dhabi	16	11	-	36	-	53	-	-
U.S.A.	19,848	15	-	43	-	53	-	-
Syria	1	17	-	34	-	49	-	-

1/ Percents reflect weights of single unit truck plus 50/50 split for axles of full trailer. See page of this report.

truck and trailer combinations, six had weighings of the truck separate from the trailer while 35 were weighed as a unit. Two alternatives were considered to analyze this combination, first by using the average weight established from trucks weighed as a single vehicle. In this case trucks of the truck trailer combination would have constant weights with the trailer weight, a variable, being the difference between the truck weight and the total weight. The second procedure would use data from separate weighings of the truck and trailer in which case a proportion was established for each unit relative to the total weight of the combination.

It was decided to use the latter procedure so that a varying truck and trailer weight would be used throughout the analysis which is more representative of the weights on the road. Therefore, for the truck and trailer combinations with loads, 48 percent of the total weight was apportioned to the truck and 52 percent to the trailer. For the empty combinations 63 percent of the total weight was apportioned to the truck and 37 percent to the trailer.

Based upon the axle load distribution percentages noted in Table IV-10, total vehicle weights noted in Appendix Tables 1 and 2 were further analyzed. Axle loadings were established and noted in Appendix Tables 3 and 4 for the single unit trucks and combination vehicles respectively.

2. Legal Loadings

The Consultant, in the course of the study, recognized the high incidence of loading over the legal limit and its implications on design and indicated same to the Steering Committee. The Steering Committee instructed the Contractor to assume enforcement of the legal limit and to report on the effect of this action.

Loads over the legal limit would still occur despite the enforcement of loading at the legal limit; however, they would be expected to occur at a lesser frequency than at present and be of smaller magnitude. The situation of existing trucks carrying smaller loads than they now carry, particularly in view of modification of a sizeable portion of the fleet to handle the large loads currently being carried, would create short range financial problems for their owners. In addition, there would be an urgent necessity to change the character and growth rate of the present day fleet. This could and should be partially implemented during the project construction period to soften its impact.

The legal loading problem addresses itself to comprehensive study to evaluate the number and character of additional trucks required to handle the present and projected goods to be moved and to determine the effect of such an increase in vehicle imports on the economy. The full range of such a study is not within the scope of this project. However, in the preparation of the analysis of legal load enforcement, consideration was given to such items as:

- Traffic law governing legal loads,
- Vehicle types in the projected fleet,
- Projected loading practices,
- Vehicle weights.

a. Traffic Law Governing Legal Loads

Vehicle load requirements are governed by Traffic Law No. 19, effective 30/3/74, adopted by Parliament 3/3/74 which superseded Traffic Law No. 71 adopted 26/9/53 and its subsequent modifications. The relevant part of the law dealing with vehicle weights is Chapter Seven, Section No. 158 which specifies the following maximum loads for various vehicles and vehicle combinations:

(1) Two-axle trucks will have a maximum loading of 19 metric tons.

(2) Trucks with more than two axles will have a maximum loading of 26 metric tons.

(3) Combination vehicles of truck and trailer or tractor and semi-trailer which have a two-axle pulling vehicle will have maximum loads of 30 metric tons.

(4) Combination vehicles of truck and trailer or tractor and semi-trailer which have a pulling vehicle of more than two axles will have maximum loads of 35 metric tons.

These maximum weight restrictions are modified by individual axle restrictions as follows:

(a) The heaviest loaded single axle cannot be greater than 13 metric tons.

(b) A vehicle or combination of vehicles having more than two axles shall have a maximum load per axle computed as follows: If the distance between axles is 90 cm. or less, the maximum axle load will be 7,350 kg. (therefore, tandem axles with a separation of 90 cm. or less have an allowable loading of 14,700 kg.). If the distance between axles is greater than 90 cm., the maximum axle load can be increased at a rate of 350 kg. for every 5 cm. additional distance between the axles beyond the 90 cm.; however, the maximum for any single axle will not exceed 13 metric tons, as noted in (a) above.

Plate 1 shows various vehicle truck trypes seen on Syrian highways and the legal weights to which they can be assigned.

b. Vehicle Types in the Projected Fleet

With the numerous types of trucks, truck-trailers, and tractor-semi trailer combinations in the present vehicle fleet, it was necessary to establish

a reasonable number of vehicle types to be considered for analysis. The six major truck-trailer combination types currently encountered on the road:

Truck, 2 axle, medium

Truck, 2 axle, large

Truck, 3 axle

Truck (2 axle) plus trailer (2 axle)

Tractor (2 axle) plus semi trailer (2 axle)

Tractor (3 axle) plus semi trailer (2 axle),

were further considered in light of legal load enforcement with a resultant projected fleet consisting of four major types. The two classes (medium and large) of two axle trucks were considered as one truck type. The truck plus trailer combination (2+2 axles) was eliminated for several reasons. The combined load permitted by law for this combination is 30 metric tons with the truck permitted to weigh 19 tons, allowing 11 tons remaining for the trailer. The average tare weight of the trailer in Syria was found to be 8 tons, leaving an available pay load for the trailer of only 3 tons. Reduction in the trailer weight would have to be of considerable proportion before the trailer would be an economic vehicle for hauling cargo. Trailers are locally produced, and are not made of lightweight products, such as aluminium; therefore, it was not practical to include in this analysis situations which would necessitate the introduction and evaluation of an industry which is presently nonexistent.

c. Projected Loading Practices

Previous surveys established the high incidence of overloads and considerable delays encountered in loading. Under legal load enforcement the number of overloads can be expected to be reduced considerably. In addition, it was also necessary to consider the effect upon the number of empty vehicles that would be on the road with legal loadings being enforced.

The number of empty vehicles on the highway are assumed to be either returning for cargo or searching for cargo. Their numbers would be reduced only if the portion searching for cargo is provided increased opportunity for success. This portion is thought to be small and it would seem that while increased opportunity might be afforded by enforcement it would be negated by the fact that facilities to accomplish it may not be available.

Trucks in the Lattakia staging area regularly experience a two day delay prior to picking up a load. Therefore, with more trucks required under enforcement it can be assumed that empty trucks are going to experience longer delays unless loading facilities are increased or improved. It is therefore assumed that the net effect of these factors is offsetting. Overall then, the total number of empty trucks on the road today will be considered increased by the additional precent of trucks needed to move the goods.

d. Vehicle Weights

Vehicle weights for present traffic were previously examined through analysis of available weigh data and the weighing survey. In order to project traffic assuming legal load enforcement, it is necessary to examine the vehicle weights, both empty and loaded, that would prevail under this condition. The results of this study showed that all trucks are not loaded to their legal maximum, and trucks of various types exhibit a considerable load range when empty and loaded.

One source of data which aided in this determination was a report[1/] which contained average empty and loaded weights of a large number of truck and

[1/] Truck Traffic Volume and Weight Data for 1971 and Their Evaluation, Federal Highway Administration, Offices of R & D, Washington, D.C., Report No. FHWA-RD-76-138, December 1976, Final Report

combination vehicles. In addition, data also included the range of weights for each vehicle studied so that it was possible to plot an S curve reflecting the entire distribution.

In order to establish a data base for Syria, it was necessary to deter- the approximate size of vehicles that would be on the road. It was assumed that these vehicles are constructed to carry a practical maximum gross weight. Based on this premise, empty weights of trucks were established for trucks intended to carry legal weights as prescribed by Syrian Law. The procedure utilized U.S. empty vehicle weights and a practical maximum weight for these vehicle types and applied them to Syrian legal loads to establish an estimated empty weight.

The range of weight established for the four vehicle types which include overloads that could be expected to occur under enforcement, are in Table IV-11. The Syria average payload was then determined as shown in Table IV-12.

TABLE IV-11

RANGE OF WEIGHTS FOR LEGAL LOADINGS

Vehicle Type	Empty	Loaded
2 axle truck	4-13 tons	9-23 tons
3 axle truck	7-18 tons	13-38 tons
2 axle tractor plus 2 axle semi-trailer	9-22 tons	11-37 tons
3 axle tractor plus 2 axle semi-trailer	10-25 tons	21-45 tons

TABLE IV-12

AVERAGE WEIGHTS TO ESTABLISH LEGAL LOADINGS

Vehicle Type	U.S. Average Empty Weight	U.S. Practical Maximum	Syria Legal	Syria Determined Empty	Syria Loaded Weights	Syria Average Payload
2 axle truck	4.7	12.0	19.0	7.5	15.7	8.2
3 axle truck	8.6	19.5	26.0	11.5	21.0	9.5
2 axle tractor plus 2 axle semi-trailer	11.6	26.8	30.0	13.2	22.6	9.4
3 axle tractor plus 2 axle semi-trailer	13.6	33.4	35.0	14.3	31.6	17.3

e. Assumed Truck Fleet

In establishing a truck fleet reflecting four truck types in lieu of the current six major types, it was decided to continue the present proportions of single unit trucks; however, truck combinations were revised. It was concluded that a high volume of tractor semi-trailers of five axles would predominate assuming legal load enforcement as opposed to the existing four axle combination vehicles under present loading practices. This is due to the larger weights that can legally be carried by the five axle combination, 35 metric tons vs. 30 metric tons. Future combination vehicles would be composed of five axle combinations which would comprise approximately 90 percent of the total while four axle combinations would comprise the remaining ten percent of the total. The proportions of the truck fleet for the present and legal loadings are noted in Table IV-13.

TABLE IV-13

TRUCK PROPORTIONS
PRESENT AND LEGAL LOADINGS

Present Proportions	Lattakia-Haffe/Slenfe Road Junction	Haffe/Slenfe Road Junction - Jisr esh Shugur	Jisr esh Shugur Bypass	Jisr esh Shugur-Ariha
2 axle truck	82.4%	81.7%	80.8%	78.2%
3 axle truck	3.8%	3.1%	3.2%	6.4%
Truck + Trailer	4.0%	4.4%	4.0%	4.9%
Tractor + ½ Trailer (4 axles)	8.6%	9.5%	10.5%	9.2%
Tractor + ½ Trailer (5 axles)	1.2%	1.3%	1.5%	1.3%
Legal Loading Proportions				
2 axle truck	82.4%	81.7%	80.8%	78.2%
3 axle truck	3.8%	3.1%	3.2%	6.4%
Tractor + ½ Trailer (4 axles)	1.4%	1.5%	1.6%	1.5%
Tractor + ½ Trailer (5 axles)	12.4%	13.7%	14.4%	13.9%

f. Truck Volumes

In determining the effect of assumed legal load enforcement on trucking, it was necessary to reevaluate the effect upon the truck growth rate and the truck volumes that would be on the road. The basis of this evaluation was the economic data presented in the report and the anticipated truck volume needed to carry such goods volumes.

The tonnage to be moved is noted as follows:

Year	Total Tons
1976	5,162,700
1983	9,107,900
1993	17,498,000
2003	29,157,500

Also taken from the economics section of the report is the fact that 811 trucks will be used to move the 5.162 million metric tons in the year 1976 which is an average 17.4 metric tons per truck. Based upon data contained in this section of the report, it was calculated that the weighted average of the legal loads would be 9.5 metric tons per truck. Calculations of truck volumes then indicate that from a 1976 need of 811 trucks, there would be a need of 1,489 trucks to handle the same volume of goods under legal loadings, which is an increase of 84 percent in the number of trucks.

Using the average legal load of 9.5 metric tons per truck as the base for the future analysis, it was determined that the number of trucks needed to move the goods volumes would be:

Year	Truck Volumes
1976	1,489
1983	2,627
1993	5,046
2003	8,409

Because of variations in the tonnages per truck and the rates used in the original analysis, growth rates were at somewhat of a variance than originally established, as follows:

	Time Period		
	1976-1983	1983-1993	1993-2003
Original Rates, Present Loading Practice	9.1%	6.9%	5.5%
Revised Rates, Legal Load Enforcement	8.4%	6.7%	5.2%

Traffic Projections

Traffic projections were prepared for each of the two situations analyzed, the present traffic volumes and the legal traffic volumes. In both cases car and bus vehicle projections were similar, while changes affected trucks only.

It should be noted that pick up trucks were not physically considered in the establishment of legal loads; however, they are projectea using the truck legal loading growth rates.

Annual traffic projections were prepared for each of three situations involving direction; namely both directions, westbound and eastbound and for each of the four road segments; namely: Lattakia-Haffe/Slenfe Road Junction, Haffe/Slenfe Road Junction to Jisr esh Shugur, Jisr esh Shugur Bypass, and Jisr esh Shugur to Ariha.

1. Present Practices

a. Base Traffic

Traffic volumes used for the base year are noted in Table IV-14.

TABLE IV-14
BASE YEAR TRAFFIC VOLUMES
PRESENT PRACTICES

	Lattakia to Haffe/Slenfe Road Junction		Haffe/Slenfe Road Junction to Jisr esh Shugar		Jisr esh Shugur Bypass		Jisr esh Shugur Ariha	
Vehicle Type	East-Bound	West-Bound	East-Bound	West-Bound	East-Bound	West-Bound	East-Bound	West-Bound
Passenger Car	103	99	93	90	83	84	141	100
Taxi	71	71	62	53	45	42	134	73
Pick up Truck	127	122	86	96	53	67	252	205
Micro Bus	89	76	38	34	6	9	41	37
Bus	22	19	12	12	5	7	23	19
Truck, 2 axle	310	296	292	268	260	220	276	278
Truck, 3 axle	13	15	12	9	12	7	23	22
Truck Trailer	15	14	16	14	14	10	23	12
Tractor, ½ Trlr.	34	38	36	38	34	37	38	36
Total	784	750	647	614	512	483	951	782

b. Growth Rates

Growth rates established by project economists and used for the various vehicle types are as follows:

	1978-1983	1983-1993	1993-2003
Passenger car	10.5%	8.7%	6.2%
Taxi	10.5%	8.7%	6.2%
Pick up Truck	9.1%	6.9%	5.5%
Micro Bus	9.2%	8.1%	6.1%
Bus	9.2%	8.1%	6.1%
Truck, 2 axle	9.1%	6.9%	5.5%
Truck, 3 axle	9.1%	6.9%	5.5%
Truck Trailer	9.1%	6.9%	5.5%
Tractor, ½ Trailer	9.1%	6.9%	5.5%

c. Projected Volumes

Traffic projections for the various combinations are shown in Appendix Tables 5 to 16.

2. Legal Loadings

a. Base Traffic

The traffic volumes for this case reflect the greater number of trucks needed to carry the goods and the change in vehicle types anticipated. Because it was not possible to establish the types of vehicles carrying each of the commodities, each truck category has been increased by the previously determined 84 percent because of greater truck needs. The vehicle categories remaining the same are: passenger car, taxi, pick up truck, micro bus and bus. The category of truck trailer has been eliminated; however, tractor semi-trailers now are considered to represent the truck combination vehicles.

Traffic volumes used for the base year traffic are noted in Table IV-15.

TABLE IV-15

BASE YEAR TRAFFIC VOLUMES
LEGAL LOADINGS

Vehicle Type	Lattakia To Haffe/Slenfe Road Junction		Haffe/Slenfe Road Junction to Jisr esh Shugur		Jisr esh Shugur ByPass		Jisr esh Shugur To Ariha	
	East-Bound	West-Bound	East-Bound	West-Bound	East-Bound	West-Bound	East-Bound	West-Bound
Passenger Car	103	99	93	90	83	84	141	100
Taxi	71	71	62	53	45	42	134	73
Pick up Truck	127	122	86	96	53	67	252	205
Micro Bus	89	76	38	34	6	9	41	37
Bus	22	19	12	12	5	7	23	19
Truck, 2 axle	570	545	537	493	478	405	508	512
Truck, 3 axle	24	28	22	17	22	13	42	40
Tractor, ½Trlr.	90	96	96	96	88	86	112	88
TOTAL	1096	1056	946	891	780	713	1253	1074

b. Growth Rates

Growth rates used in this analysis are noted in the following table. Project economists established growth rates for the categories: passenger car, taxi, micro bus and bus. Truck rates were established in the preceding section.

	1978-1983	1983-1993	1993-2003
Passenger Car	10.5%	8.7%	6.2%
Taxi	10.5%	8.7%	6.2%
Pick up Truck	8.4%	6.7%	5.2%
Micro Bus	9.2%	8.1%	6.1%
Bus	9.2%	8.1%	6.1%
Truck, 2 axle	8.4%	6.7%	5.2%
Truck, 3 axle	8.4%	6.7%	5.2%
Tractor, ½ Trailer	8.4%	6.7%	5.2%

c. Projected Volumes

Traffic projections for the various combinations are shown in Appendix Tables B-17 to B-28.

Annual Equivalent Axle Loads

1. General

The procedure used for pavement design takes into account current and projected traffic volumes and axle equivalency factors and converts them into annual equivalent axle loads. These annual forecasts are accumulated and used to establish the number of loadings for any given time period considered in the design of the pavement. These forecasts, however, present considerable difficulty for the following reasons:

. Many vehicles currently carry loads which exceed the present legal maximums; however, these loads could change at any time depending on the regulations controlling axle loads and the degree of enforcement of these regulations.

. Axle load limits may or may not change in the future; however, they may be applied selectively to specific classes of highways in the system.

. Advanced technology could introduce vehicle types and engine sizes heretofore not known or used in Syria which could affect single or tandem axle frequencies and magnitudes.

Equivalent axle factors have been established for single as well as tandem axles through considerable highway research with the most commonly used factors being those established by the AASHTO Road Test conducted in the United States. Factors were derived empirically from experimental results and have been established to represent a range[1/] of surface conditions and structural adequacy

[1/] "Principles of Pavement Design", by Yoder and Witczak

of the pavement. For this Syria study, the equivalence factors for specific axle loads were based upon a serviceability factor of 2.0 and a structural number of 3.

a. Cargo Trucks

Equivalence factors in the reference were limited to loads of 19 tons for the single axle and 22 tons for the tandem axle. Since loads in Syria in many cases were greater than the maximum noted in the equivalence tables, the given factors were plotted and additional factors taken from the extrapolated graph in order to consider single axle loads to 21.5 metric tons and tandem axle loads to 34.5 metric tons.

b. Buses

Equivalence factors are also used for buses; however, no weight data was obtained for these vehicles. It was therefore considered that a large bus would be represented by a factor of 0.15. Because bus volumes also include a considerable number of micro buses, it was decided to give a weighted axle load equivalent of 0.05 to all buses considered in the study.

2. Present Practices

The present vehicle weigh data and axle load equivalent data were analyzed with results shown in Table IV-16 indicating the magnitude of the loads being carried on the highway. The vehicle reflecting the greatest number of axle load equivalents is the loaded truck and trailer combination which consists of a two-axle, six tire, large truck and two-axle trailer. This combination had an axle load equivalent of 63.60 while the loaded two-axle, six tire truck had an axle load equivalent of 31.11. The effect of the axle configurations can be seen in a comparison between three types of combination vehicles which have similar total weights of 54 tons, 51 tons and 50 tons, but equivalent axle loads of 63.60, 37.33 and 13.27. As expected for similar size loadings, tandem axles

do less damage than single axles. From the survey data, the combination vehicle with the heaviest loading was a truck and trailer combination of four single axles which weighed 64.1 metric tons and had an equivalent axle load of 119.36. The heaviest single unit vehicle was a two axle truck weighing 29.6 metric tons and had an equivalent axle load of 68.7.

TABLE IV-16
AXLE LOAD EQUIVALENTS
PRESENT PRACTICES
PORT OF LATTAKIA, FEBRUARY 1978

Vehicle Type	Status	Average Axle Load Equivalents				
		Front	Second	Third	Fourth	Total
Single Unit Vehicles						
2 Axle, 6 Tire, Medium	Empty	0.02	0.03	-	-	0.05
	Loaded	0.12	3.98	-	-	4.10
2 Axle, 6 Tire, Large	Empty	0.07	0.20	-	-	0.27
	Loaded	0.71	30.40	-	-	31.11
3 Axle, 10 Tire	Empty	0.15	0.11	-	-	0.26
	Loaded	1.22	10.95	-	-	12.17
Combination Vehicles						
Truck + Trailer (2 Axles + 2 Axles)	Empty	0.14	0.33	0.02	0.02	0.51
	Loaded	0.92	38.80	11.94	11.94	63.60
Tractor + ½ Trailer (2 Axles + 2 Axles)	Empty	0.07	0.20	0.07	-	0.34
	Loaded	0.47	21.73	15.13	-	37.33
Tractor + ½ Trailer (3 Axles + 2 Axles)	Empty	0.06	0.06	0.07	-	0.19
	Loaded	0.22	2.18	10.87	-	13.27

Using the above noted axle load equivalents, factors were prepared for each of the four study segments and are summarized in Table IV-17 with details shown in Appendix Tables 29 to 32. Individual factors were prepared for eastbound and westbound traffic and a weighted factor established representative of the segment. These factors along with the 0.05 factor for buses were used to prepare tabulations of equivalent axle loads for combined traffic, eastbound and westbound traffic and are shown in Appendix Tables 33 to 44.

TABLE IV-17

SUMMARY OF EQUIVALENT AXLE LOAD FACTORS
PRESENT PRACTICES

Road Segment	Eastbound	Westbound	Weighted
Lattakia to Haffe/Slenfe Road Junction	18.86	5.57	12.30
Haffe/Slenfe Road Junction to Jisr esh Shugur	19.24	5.61	12.69
Jisr esh Shugur Bypass	19.25	5.64	12.97
Jisr esh Shugur to Ariha	19.26	5.61	12.55

3. Legal Loadings

Assuming legal load enforcement, equivalent axle loadings for each of the vehicle types were established and are noted in Table IV-18.

TABLE IV-18

AXLE LOAD EQUIVALENTS
ASSUMING LEGAL LOAD ENFORCEMENT

Vehicle Type	Empty	Loaded
2 axle truck	0.11	4.31
3 axle truck	0.12	1.82
2 axle tractor plus 2 axle semi trailer	0.11	1.20
3 axle tractor plus 2 axle semi trailer	0.06	2.03

Using the above noted axle load equivalents, factors were prepared for each of the four study segments and are summarized in Table IV-19 with details shown in Appendix Tables 45 to 48. Individual factors were prepared for eastfound and westbound traffic and a weighted factor established representative of the segment. These factors along with the 0.05 factor for buses were used

to prepare tabulations of equivalent axle loads for combined traffic, eastbound and westbound traffic and are shown in Appendix Tables 49 to 60.

TABLE IV-19

SUMMARY OF EQUIVALENT AXLE LOAD FACTORS
LEGAL LOADING PRACTICES

Road Segment	Eastbound	Westbound	Weighted
Lattakia to Haffe/Slenfe Road Junction	3.47	1.16	2.33
Haffe/Slenfe Road Junction to Jisr esh Shugur	3.45	1.15	2.34
Jisr esh Shugur Bypass	3.44	1.14	2.38
Jisr esh Shugur to Ariha	3.38	1.12	2.27

The projection procedure used for the tables reflects the number of trucks needed to carry legal loads as of the year 1978 and carried through to the end of analysis time period 2003. An alternate procedure would have been to increase the truck volumes gradually to the year 1984 when the project would be opened to traffic. In either case the truck volume in 1984, the year the project is to be opened to traffic, would be the same and therefore the resulting economic analysis would be similar over the actual life of the project.

FACILITY REQUIRED

The traffic volumes projected in the previous paragraphs indicate that within the period of analysis a multi-lane facility with limited access will be highly desirable. The economic determinations of the optimum stage timing for various stages of the development of such a facility are to be included in reports to follow this alignment selection report. For purposes of alignment selection it is assumed that the facility to be constructed (whether by stage construction or otherwise) will be a four-lane highway with limited access.

(This facility will hereinafter be referred to as an "expressway"). It is assumed that the alignment selected must be suitable for the ultimate development, but that the alignment selection should not preclude stage development. In the paragraphs which follow, the facility discussed is the four-lane facility. All discussions of interim stages of construction are deferred until preparation of the Final Draft Report; however, interim stages have been considered in the general engineering planning of the facility.

The expressway will have only two basic typical sections as shown on Plate 2 in Part VI, Recommended Geometrics. The first and most common section will have very few restrictions on the median width. The medium width may vary to accommodate wide planting strips or benching and separation of roadways serving opposite directions of travel. The second type envisioned is a much tighter section, with a narrow median. This section will be employed where right-of-way is restricted by physical or cultural features such as railroads, historic sites, and urban developments. The restricted width may also be employed to reduce construction costs in areas of deep cut or high embankment and of bridge approaches.

The selection of the vehicle speed is one of the most important factors governing the design of the expressway. The economic value of the expressway can be directly related to the speed and safety of transporting people and goods. Four factors which relate to the speed that a vehicle operator will select are:

1. Physical Characteristics of the Roadway
2. Weather
3. Influence of Other Vehicles
4. Speed Limitations

While all of the above factors are interrelated, the physical characteristics of the roadway will have the greatest influence on speed (other factors being equal). Examples of these physical characteristics are such items as lane width, grade, curvature, stopping sight distances and lateral clearances. Selection of values for all of these parameters is dependent on design speed. The design speeds selected for the expressway should be most liberal to afford the greatest ease of driver operation and safety. Construction costs, however, restrict the selection of high design speeds for the expressway. Terrain becomes an important consideration and the selected design speed must be optimized by evaluating construction costs versus savings in vehicle operating costs. The interrelationship of these factors has been the subject of study by many highway construction agencies for a number of years, and certain generally accepted conclusions have evolved. For the purposes of this report the recommendations of AASHTO have been considered in conjunction with the standards currently in use by the Ministry of Communications to arrive at recommendations for design speed in relationship to terrain encountered by the route. Terrain has been categorized into level, rolling, and mountainous, and the design speeds have been specified according to the terrain. Design speeds recommended are as follows: 120 KM/HR for level terrain without right-of-way restrictions, 100 KM/HR for rolling terrain and areas without right-of-way restrictions, 80 KM/HR for rolling terrain and mountainous areas, and areas of right-of-way restrictions. The Lattakia-Ariha segments traverses terrain encompassing all of these features.

The stopping sight distance used for the expressway is based on these design speeds and employs methods as prescribed by AASHTO with driver's eye approximately 1.10 meters above the pavement and the height of the object (obstacle) 10 centimeters. Appropriate allowance for stopping sight distance

must be made for significant grade changes.

The horizontal alignment selected for the expressway should provide for safe, continuous operation at a uniform design speed. However; minimums will be avoided where practicable. Minimum radii will be used only when the cost of realizing a higher standard is disproportionate to benefits. Transition spirals are suggested for all horizontal curves.

Gradients are generally controlled by terrain, highway classification, horizontal alignment, safety, construction costs, drainage and aesthetics. In level terrain the gradients are primarily controlled by drainage considerations. A 0.5 percent minimum gradient was selected as necessary to provide drainage for the median ditch. In rolling terrain, undulation of gradients is advantageous from the standpoint of truck operations and construction economy. AASHTO recommends that grades in rolling terrain not exceed a maximum of four to five percent depending on the type of expressway, and that grades in mountains should not exceed eight percent.

Preliminary design criteria selected for ramps, frontage roads, and crossroads are shown in Table IV-20.

A lane width of 3.5 meters has been selected for the preliminary design of the expressway. Three and one half meters has benerally been used in the past for design of expressways in Syria. This width approaches the width recommended by AASHTO. The high percentage of truck traffic influences the requirement for wide lanes. The extra cost of the wide lanes will be offset to some extent by a reduction in the cost of shoulder maintenance and a reduction in surface maintenance due to lessened wheel concentrations at the edges of pavements. A cross slope of two percent has been selected for the

traffic lanes. This will provide positive drainage toward the shoulder and eliminate any "birdbath ponding" which might otherwise result from inadequate construction control.

Shoulder widths of three meters and one meter have been selected for the right-of-way side and median side of the expressway respectively. The one meter median shoulder is primarily for the vehicle operator to correct any driving errors without losing control if he inadvertently steers off the traffic lane. The shoulder on the right-of-way side is wide enough to accommodate a disabled truck. Cross slopes of both shoulders are set at four percent to provide positive drainage away from the roadway.

Ditches will be required in wide medians, along both sides of the roadway and as interceptors on the tops of cuts. Interceptor ditches and steep roadside ditches will require paving.

Fill slopes have been arbitrarily set at a maximum of 2:1 for ease of maintenance and to reduce erosion. Cut slopes shall vary from ¼:1 for sound rock to 2:1 for soil, dependent; also, on material type, bedding planes, subsurface water and other pertinent factors where permitted without imposing extraordinary construction costs, all cut slopes greater than four meters should be benched at vertical intervals of four meters. Both cut and fill slopes less than three meters in height should have 4:1 side slopes. Subdrains will be required in all cuts where subsurface water is encountered or anticipated.

The median width shall be 12.0 meters from edge of shoulder to edge of shoulder where there are no right-of-way restrictions. The 12 meter median width is advantageous for future expansion of the expressway. Median slopes in this area shall be 6:1. The transition from the section with a wide median to the section of narrow medians shall be accomplished by a 50:1 minimum taper on tangent sections and by tansition spiral on curves. Medians for expressway

TABLE IV-20

RECOMMENDED DESIGN CRITERIA

DESCRIPTION	EXPRESSWAY	EXPRESSWAY RIGHT-OF-WAY RESTRICTED	RAMPS	FRONTAGE ROADS AND CROSSROADS
DESIGN SPEED MINIMUS (KM/H)				
Level Terrain	120	100	60	100
Rolling Terrain	100	80	60	60
Mountainous Terrain	80	80	60	60
STOPPING SIGHT DISTANCE (M)				
120 KM/H	200	200	-	-
100 KM/H	150	150	-	150
80 KM/H	110	110	-	110
60 KM/H	-	-	80	80
PASSING SIGHT DISTANCE (M)				
100 KM/H	-	-	-	700
80 KM/H	-	-	-	550
60 KM/H	-	-	-	425
MINIMUM RADIUS OF CURVATURE (M)				
120 KM/H	675	675	-	-
100 KM/H	420	420	-	420
80 KM/H	230	230	-	230
60 KM/H	-	-	145	145
MAXIMUM SUPERELEVATION (%)				
120 KM/H	6	6	-	-
100 KM/H	6	6	-	6
80 KM/H	8	8	-	8
60 KM/H	-	-	8	8
TRANSITION CURVES	YES	YES	NO	NO
MINIMUM GRADE	0.5%	0.5%	0.5%	0.5%
MAXIMUM GRADE				
Level Terrain	3.0%	3.0%	7.8%	3.0%
Rolling Terrain	4.0%	5.0%	7.8%	5.0%
Mountainous Terrain	8.0%	8.0%	8.0%	8.0%

TABLE IV-21

CROSS-SECTIONS ELEMENTS

DESCRIPTION	EXPRESSWAY	EXPRESSWAY RIGHT-OF-WAY RESTRICTED	RAMPS	FRONTAGE ROADS AND CROSSROADS
Cross Slope of Roadway	2.0%	2.0%	2.0%	2.0%
Lane Widths (M)	3.50	3.50	4.20	3.50
Shoulder Cross Slope	4.0%	4.0%	4.0%	4.0%
Shoulder Width, R/W Side (M)	3.00	3.00	1.00	3.00
Shoulder Width, Median Side (M)	1.00	1.00	1.00	-
Side Ditch Slopes	2:1	2:1	2:1	2:1
Median Ditch Slopes	6:1	6:1	6:1	6:1
Median Width (M)	12.00	4.00	-	-
Guard Railing				
Median	NO	YES	-	-
Fill Slopes Greater than 3M	YES	YES	YES	YES
Lighting	NO	YES	YES	NO
Fencing	YES	YES	YES	NO
Right-of-Way (M)	60	VARIES	-	VARIES

with right-of-way restrictions are set at 3.0 meters from the edge of the shoulder to the edge of the shoulder. The entire narrow median will be surfaced and have guard rail to prevent vehicles from entering opposing traffic lanes.

Other features required for the expressway include:

1. Lighting at interchanges and in urban areas.
2. Turn outs and rest areas at scenic points along the route.
3. Fencing to preclude stray or herded animals or people from crossing the traffic lanes.

Minimum right-of-way required for the expressway will be 60 meters and 40 meters for the unrestricted and restricted sections respectively.

The recommended cross-section elements for expressways, ramps, frontage roads, and crossroads are summarized in Table IV-21 .

GENERAL GEOLOGY AND SOIL CONDITIONS

Previous Work

The existing roadway between Lattakia and Ariha was examined and the geotechnical sections of a feasibility report prepared for the Ministry of Works by SCETC was reviewed, in 1964, in order to determine if any geological or soil conditions should influence the location of the alignment and to establish what additional work should be performed for the preliminary engineering phase. A limited amount of sampling and testing had been performed by SCETC, but no borings nor dynamic cone soundings were conducted at the structure locations.

General Geology

Beginning at Kilometer 100 the existing roadway traverses about 16 kilometers of flood plain of Al Kabir Al Shamaly River, along with slightly higher

first terrace level of sandy clays and conglomerate, both the flood plain and terrace sediments are Quaternary in Age. Between Km. 116 and 124, the roadway passes over a gypsum-marl-limestone association of Upper Miocene Age. This formation has a resistant basal limestone member which forms a caprock over the more easily eroded underlying formation. Several waterfalls occur, over this caprock, in the valley as streams enter into this tributary of Al Kabir Al Shamaly River.

The existing roadway follows the flood plain of Al Kabir Al Shamaly River between kilometer 127 (where it emerges from a short 3 kilometers canyon section) and kilometer 138. The rocks in the adjacent valley walls are marine marls, limestones and sandstones of the Middle Miocene Age. The roadway continues in these rocks for another 11 kilometers, after it leaves the river flood plain, or up to kilometer 149. For the next 17 kilometers, or until Jisr esh Shugur, the present roadway traverses a number of different formations: Lower Miocene limestones and marls; Upper Cretaceous chalky limestones and marls; Cretaceous dolomites and limestones; Middle Miocene nummulitic limestones and marls; Pliocene conglomerates and calcareous sandstones, and flood plain sediments.

East of Jisr esh Shugur, the roadway traverses Pliocene basalts and Tuff-Breccia for 15 kilometers, or up to kilometer 192. Between kilometer 192 and 210, or Ariha, the existing road lies mainly within Neogene conglomerates and sandstones. Eocene and Cretaceous limestones and marls are also traversed along with a short section of flood plain sediments.

Roadway Soils and Materials

Only a limited amount of sampling and testing of the subgrade soils was performed by SCETC. Index tests, including gradations and Atterberg limits

were performed and moisture-density relationships or CBR values were established. Aggregate sources were located, mostly from adjacent streams and flood plains, but the quality was not evaluated through laboratory tests.

The soils in the flood plain to the northeast of Lattakia are essentially granular, or typically A-2-4 with 0 Group Index. These soils persist for the 16 kilometers that the road lies within this section of Al Kabir Al Shamaly River flood plain.

Beyond kilmometer 116, the soils that have formed over the various formations are generally fine-grained. The few samples tested fell within the A-7-5 classification with Group Indexes varying from 4 to 13. Exceptions to this occur in very short sections of less than 3 kilometers along the flood plain between kilometer 126 and 137 within the dolomitic limestones, kilometer 146 to 149, within the flood plain near kilometer 158, and within the conglomerates in the vicinity of Jisr esh Shugur. Although a number of formations are crossed in this section as well as in the last 15 kilometers or so before Ariha, the rocks types are not greatly different, with limestones and marls predominating.

Between Jisr esh Shugur, kilometer 170 and kilometer 197, the present roadway passes through basalts and dark gray to red soils developed on these volcanic rocks. No samples were collected in this section by SCETC. Such soils often are expansive and require special treatment.

Material sources are plentiful along the streams and within the harder limestone outcrops, at least as far as Jisr esh Shugur. There are no suitable sources in the basalts and between 197 and Ariha suitable limestone is scarce. One potential source was identified at about kilometer 203. The volcanic cinder cones near Jisr esh Shugur are other possible sources.

Alignment Considerations

There are no soils or geological conditions that warrant influencing the location of the alignment. Variations in geology and soils occur throughout the project length, due to topography, mainly as exposed by erosion. Changes in the geological formations, however, do not result in significant changes in rocks types.

Slides occur in the short canyon section between kilometer 22 and 26. These are shallow and are mainly due to uncontrolled water seepage; dainage provisions should provide stability.

Aggregate sources are generally plentiful for most of the project length. The volcanic soils may be expansive but should not cause undue difficulty as subgrade material.

Geotechnical Program for Preliminary engineering

The works performed by SCETC should be amplified for the preliminary engineering phase. Additional subgrade samples will be collected and tested; 10 samples are believed to be sufficient. These will be tested for classification, moisture-density relationships and CBR. Subgrade CBR values will be rapidly estimated in the field by means of a hand-cone device. About six aggregate sources will be sampled and tested for CBR and Los Angeles abrasion.

Approximately eight test pits will be excavated through the existing pavement to ascertain the thickness, character, moisture content and density of each layer. The actual number of pits will depend on how much of the existing roadway alignment and pavement structure is retained.

Foundation investigations are required for the major structure. Those in the flood plain deposits may require deeper foundations than those in areas

where bedrock is shallow. Seismic refraction profiles are believed to be sufficient for preliminary engineering in the areas where bedrock is shallow, but it is doubtful if a sufficiently deep profile can be developed within the flood plain sediments. One cone penetrometer probe per structure is planned, if the dynamic cone is not available. It is estimated that eight structures will require either probing or drilling.

Further sampling and testing will be required for the final design phase. Sampling and testing frequency should be reduced so that several pavement sections can be designed based on the subgrade variations and borrow material. Stabilization testing may be advisable for these sections with fine-grained soils. Aggregate sources will need to be investigated for both quality and quantity. Finally foundations for the many structures will require drilling. The dynamic cone penetrometer, if available, may be substituted for many of the holes, but not all. Similarly, seismic profiles may be substituted for some of the drill holes if this procedure proves satisfaction. These investigations are not considered necessary for the preliminary engineering phase.

LOCATION DESCRIPTION

Pursuant to the Contract Scope of Work, the Consultant is to perform studies and to prepare technical, economic and environmental analyses for construction of a new expressway with full and/or limited control of access between Lattakia and Ariha, via the town of Jisr esh Shugur and Mugambil, a distance of approximately 110 kilometers. The facilities are to be based on construction to the primary standard of the Ministry of Communications for an asphaltic concrete surfaced four-lane divided highway which will accommodate maximum projected traffic needs.

The proposed preliminary alignment of the Lattakia to Ariha route based on these contract requirements is illustrated on the plan-profile drawings included in Part VI of this report with the stationing increasing from southwest to northeast. Two alignments labeled Alternate 'A' and Alternate 'B' are shown along some sections of the proposed highway. Sub-numbers; i.e., A-1, -2, B-1, -2, etc., are used to denote the order of appearance of the alternates on the plans. The recommended alignment is always labeled Alternate 'A'. Alternate 'B' alignments are shown only to clarify the considerations given in the following section entitled "ALTERNATIVE ROUTE STUDIES". A station designation of Km 100 is assigned to the beginning point of the proposed alignment. (This point is located southeast of the city of Lattakia at about Km 90 of the proposed new expressway route between Tartous and Lattakia at the location of the interchange proposed to serve the existing road to the town of Haffe.)

The following is a general description and discussion, in sequence from southwest to northeast, of controls and conditions influencing the selected route location.

KM 100 to KM 125.8

This section is the longest single portion of the proposed alignment which is completely separated from the existing Lattakia to Ariha road. As discussed under the section entitled "ALTERNATIVE ROUTE STUDIES," the principal factors influencing the selection of the location for this portion of the alignment are as follows:

1. The need for an alignment which offers maximum flexibility and freedom for long term development and expansion of the proposed industrial areas near Lattakia consistent with requisits of the pending Master Plan for the city.

2. The need for a route which ties to the existing highway network and which can readily become an integral part of a future expanded system without sacrifice of initial or future user benefits.

3. The need to relocate portions of the existing road which will be inundated by the reservoir of the Haffe Dam presently being constructed on Al Kabir Al Shamaly River about 20 kilometers northeast of the city of Lattakia.

In addition to fulfilling the above requirements, the proposed alignment offers the following advantages over all other possible alternatives investigated.

1. It is the shortest in length (e.g. it is 4.4 kilometers shorter than the existing road and 2.8 kilometers shorter than indicated in Alternate B-1).

2. A minimum of major highway structures will be required: one major watercourse bridge crossing approximately 15 meters in length at Km 103.0; two interchanges 0 one at Km 103.5 and one at Km 121.2; and, four grade separations for cross freeway traffic movements located at Km 101.3, Km 106.3, Km 108.0 and Km 113.5. No river bridge crossings or railroad overcrossings structures will be required.

3. There will be no interruption of Lattakia to Ariha Traffic during construction. Traffic interruptions along the existing road to Haffe during construction of the first three kilometers of the proposed facilities can be

expected. However, because of the length of road and volume of traffic involved, the inconvenience should not be too great.

4. It offers the maximum freedom and flexibility for selection of an alignment which will result in the most favorable construction costs.

5. It requires minimum disruption of existing building structures.

6. It provides the greatest savings to users.

Throughout the entire section, vertical alignment well within minimum project design standards can be satisfied. Existing ground elevations, excepting stream inverts, vary between elevations of +15 and +235 meters. Road gradients of 3.5% or less can be achieved for approximately 22 kilometers of the section. The remaining 2.8 kilometers will require gradients from 4% to 6%. Horizontal curvature for speeds of 100 kilometers or greater are possible throughout the section without difficulty. Curves with radii in excess of 675 meters are obtainable for approximately 22 kilometers. The remaining 2.5 kilometers of length will require curves with radii between 425 and 675 meters.

Beginning as Km 100 at the intersection with the proposed Tartous to Lattakia expressway, the recommended alignment extends in a northeasterly direction for 3.2 kilometers along the existing road to Haffe. For this portion, it is proposed that construction be confined to the southeast where the least disruption of existing building structures will occur. At approximately Km 101.3, it bypasses the village of Shirbit Sboron about 200 meters southwest of the existing road. At this station, it also intersects the existing road to the town of Fedio. A grade separation to accommodate cross expressway traffic between the two towns is proposed at this location. A

bridge structure approximately 15 meters in length and 7 meters in height exists on the present Haffe road at Km 103 for the crossing of a major water course. It is proposed that the crossing of the alignment at this location will also be accomplished with a bridge structure of about same length and height. At Km 103.2, the Haffe road turns due east and the proposed route continues northeasterly. To accommodate Haffe road users, an interchange is proposed in the vicinity of Km 103.5.

Power pole lines exist on both sides of the existing road for the first 3.5 kilometers. In addition, a power transmission line is located in close proximity to the road on the southeast side at about Km 102.2. Construction of the new highway will require relocation of these facilities. However, they are not major installations and do not involve extraordinary relocation costs.

From Km 103.2, the alignment continues northeasterly up Al Kabir Al Shamaly River Valley to a high point along the section at about Km 121 in the foothills of the Al Nusayriyah Mountains. There are 8 small villages near the route along this section which will require access. It is proposed to accomplish this with three grade separations and one interchange as indicated in the plans. Because of the nature of land uses along the route the need for local traffic service roads will be minimal. Land use along the first 19 kilometers of the route is primarily devoted to the production of irrigated crops. The remainder of the land is mostly devoted to fruit and olive orchards.

From Km 121 to Km 122.3, the proposed alignment extends in a descending grade on the southeastern slopes of a draw to an existing railroad viaduct which is located southeast of the existing road and which passes over a portion of the future Haffe Dam reservoir area. The structure is approxi-

mately 338 meters in length with twelve concrete piers varying up to 35 meters in height. There is sufficient clearance between the piers (4 end piers spaced 16.5 meters on centers and 7 interior piers spaced 34.2 meters on centers) and adequate headroom to construct the road under the viaduct above highwater elevation of the reservoir. A maximum gradient of 6% is proposed for this section. Although a cut section of about 40 meters in depth for a relative short distance through the saddle at the upper end will be required, this is not excessive considering alignment characteristics which can be achieved. Numerous other possible alignments for this section were investigated. None were found which could favorably compare with the selected location with respect to gradients, curvature and distance.

From the undercrossing of the railroad viaduct, it is necessary that a minimum alignment elevation of 105 meters be maintained because of the pool elevation of the Haffe Dam reservoir. To pass across the low area northwest of the railroad viaduct either an engineered fill or a highway viaduct structure about 200 meters in length and up to 15 meters in height will be required.

From Km 123.6 to Km 125.3, it is intended that the alignment generally parallel the railroad. It is proposed that the railroad cuts through this section be widened to accommodate the highway section and minimize construction earthwork costs.

The proposed alignment intersects the existing road at Km 125.8. The existing roadway elevation at this station is at approximately 105 meters, the high water elevation for the future Haffe Dam reservoir.

KM 125.8 to KM 159.0

Except for approximately 3.9 kilometers, this section of the proposed

alignment follows the existing road corridor from the upper reaches of the future Haffe Dam reservoir to the eastern slopes of Al Nusayriyah mountains above the town of Jisr esh Shugur. No other acceptable location for this section of the proposed road could be found.

Because of erratic topographic conditions and limiting widths of the corridor, the proposed alignment is predicated on utilizing the existing road platform as part of the new facilities wherever possible to minimize construction earthmoving costs. Where considered impractical to utilize the existing road because of disruption of developed areas, bypasses are proposed. For these sections, it is proposed that the existing road be retained as a service road.

Vertical alignment of the existing road is between extreme elevations 165 and 490 meters. Grades for the most part are less than 6%. Approximately one kilometer of the existing road has sections with gradients ranging between 6% and 8.7%. Based on the proposed alignment grades of 3.5% or less for approximately 18.3 kilometers are possible. Grades between 4% and 6% for the remaining 15 kilometers can be achieved without difficulty.

The existing road was constructed to conform as closely as possible to topographic conditions with minimum cuts and fills as evidenced by many short radii (100M or less) curves. Much of the existing alignment includes compound curves, broken back curves and consecutive curves with short connecting tangents. The proposed alignment is based on eliminating these conditions by limiting the radii of curves throughout the section to 425 meters.

There are about twelve bridge crossings of rivers and major watercourses along this section of the existing road. For the new alignment, it estimated

that only five or six such structures will be required in the vicinity of Km 124.9, Km 126.7, Km 130.0, Km 133.9, Km 135.3, and Km 137.0. All other roadway drainage structure requirements can be satisfied with either pipe or box culverts.

From Km 125.8, the proposed alignment follows the existing road along the southeastern side of Al Kabir Al Shamaly River. Between Km 126 and Km 127.5, the alignment is located northwest of the existing road in order to bypass an existing asphalt concrete plant and a concentration of building structures. Intersections of the connecting roads to Slenfe on the east and Haffe on the south are located within this section of the existing road. To provide expressway access to these roads and the undisturbed developed areas along the existing road, an interchange is proposed at Km 126.4.

From Km 127.5, the proposed alignment continues northeasterly along the existing road on the southeast side of Al Kabir Al Shamaly River to it's confluence with the Awaysat River at approximate Km 131.5. At this point, the Al Kabir Al Shamaly River turns north and the alignment follows the Awaysat River northeast along the existing road. At approximately Km 133.8, the proposed route crosses the river and underpasses an existing railroad viaduct. The viaduct is a 388 meter long 13 span structure with pier spacing of 34.2 meters on centers at the crossing. Vertical clearance at the crossing is in excess of 25 meters. To serve the built up area along the existing road between Km 131.5 and Km 134.0, an interchange is proposed at Km 133.2. Between Km 135.4 and 139.5, the proposed alignment is separated from the existing road to avoid dislocation of numerous building structures. It is proposed that the existing road will be retained as a service road to accommodate local traffic in the area.

To serve this area and villages to the southeast, interchanges are proposed in the vicinities of Km 135.7 and Km 137.6.

From Km 139.5 to approximately Km 145.0, the alignment generally parallels the river on the northwest side. Because of the close proximity of the river to the existing road, it is proposed that the improvements be limited to the northwest side of the existing road.

As approximately Km 145.0, the alignment enters a relatively flat plateau area which extends to about Km 149.0. Between Km 146.2 and Km 147.5, the alignment is separated from the existing road to avoid existing building structures and to provide space for providing an interchange at Km 147.1 for access to the villages located to the northwest and southeast. For the remainder of the alignment of this section, maximum use of the existing road right of way is proposed with improvements for the expanded new facility being confined to the southeast side to minimize disruption of developed areas.

At Km 149.3, the alignment separates from the existing road in order to parallel the railroad alignment between Km 150.3 and Km 151.8. It is proposed that the cut sections of the railroad on the southeast side be increased to accommodate the road section and to take advantage of resultant earthwork construction cost savings. Although earthwork to satisfy the proposed alignment will be substantial, it was found to be the most economical of all possible alternates investigated. It will not require any major structures, disruption of developed areas will be minimal and, compared to the existing road, it is about two kilometers shorter in length. It is proposed that an interchange be provided in the vicinity of Km 149.5 to serve traffic to and from the bypassed portion of the existing road.

From Km 152.2, the proposed alignment descends the northeastern slopes of the hills to its intersection with the existing road at Km 154.2. From this point, it follows the existing road to Km 159 - the beginning point of the new alignment proposed for traversing the eastern slopes of Al Nusayriyah Mountains to the town of Jisr esh Shugur. An interchange is proposed in the vicinity of Km 158.7 to serve the village to the northeast. Land along this section of the alignment is for the most part undeveloped. Building structures along the route are sparsely situated except for a few areas of minor concentrated buildup. The land use between Km 144 and Km 150 is devoted to the production of agriculture products with minor areas of fruit and olive orchards. Minor isolated tracts of land of similar uses are found throughout the section. The proposed alignment reflects the most favorable location for minimum displacement of building structures and productive land.

As noted above, numerous areas of possible alternate locations of the alignment between Km 149.3 and Km 158.5 were investigated. These included: use of the existing route corridor with modifications to satisfy project standards; and, possible routes which would be more direct and would result in a shorter travel distance. Use of the existing road corridor was ruled out on the basis of: adjustments and modification of the existing road necessary to satisfy project standards; longer length; disruption of existing developed properties; and, the number of major highway structures which would be required. With respect to a more direct route between the two above noted stations to achieve a shorter travel distance, no alignment which was considered feasible could be located. Investigations included detailed studies of existing topographic maps of the area and field reconnaissance examina-

tions. Maps along a direct route through the area were primarily limited to pantographic enlargements of 1:50,000 scale topography. The terrain between the two points is precipitous and irregular, and rises to approximately elevation 750 meters - about 340 meters and 260 meters respectively above the beginning and end points. Based on available information costly construction solutions as well as a circumventing alignment would be required to overcome the erratic topographic conditions, and to provide acceptable gradients to overcome the rises in elevations.

KM 159.0 to KM 171.4

The route selected for this portion of the proposed alignment is completely separated from the existing Lattakia to Ariha Road. The alignment of this section generally follows a course which bypasses the town of Jisr ésh Shugur by about 1.5 kilometers on the west and four kilometers on the south. Selection of the proposed alignment was influenced by the following:

1. It is the most direct route for traversing the western slopes of Al Nusayriyah Mountains to El Gahab Valley in the vicinity of the town of Jisr esh Shugur.

2. It passes within close proximity of the town of Jisr esh Shugur for easy access.

3. It is sufficiently removed from the Jisr esh Shugur to provide maximum flexibility and freedom for planned expansion and development of the town.

4. It will require the least displacement of developed lands and building structures within the area.

5. It crosses Al Aassi River at the best location found in the area with respect to foundation conditions and the length of structure required.

6. It provides adequate economy to road users.

Starting at Km 159.0, the proposed alignment leaves the existing road and begins a uniform descend along the western slopes of Al Nusayriyah Mountains for a distance of approximately four kilometers. Based on existing topographic maps of the area, a vertical alignment based on a maximum gradient of 6% can be achieved with cut and fill sections within reasonable limits. Except for one curve with a radius of 225 meters located between Km 159.3 and Km 159.8, horizontal alignment is limited to curves with radii of 425 meters or greater. The one short radius curve was introduced into the alignment for economic reasons. It is possible to increase the radius of this curve by more extensive earthwork. However, the quantities involved to increase it to say 425 meters are not considered justified based on resulting benefits.

At approximately Km 161.6 of this section, it is proposed to cross a deep ravine either with a high fill or a viaduct about 100 meters in length.

A railroad overpass is proposed at Km 162.4.

At the intersection of the alignment at Km 163.0 with the existing southbound road at the base of Al Nusayriyah Mountains, an interchange is proposed to serve the town of Jisr esh Shugur. From this point, the alignment follows the existing road south for approximately two kilometers with improvements for the new facilities to be located on the east side to minimize dislocation of developed areas. At approximately Km 163.2, there exists a relative new railroad overcrossing structure. It is proposed that this structure be incorporated into the new facility to accommodate northbound traffic and a new structure be provided for southbound traffic.

At Km 165.0 the proposed alignment turns east and crosses over the western side of El Gahab Valley to intersect the existing Lattakia to Ariha road at Km 171.4.

To serve on/off traffic movements of the south to north road at the foot of the Al Nusayriyah Mountains, an interchange is proposed in the Vicinity of Km 165.5. A railroad overcrossing structure is required at Km 166.2.

At Km 167.2, a bridge crossing of Al Aassi River is proposed. As noted above, the site for the crossing is the most favorable found in the area with respect to foundation conditions and length of structure required. The site is located immediately down stream from an existing railroad crossing of the river. The river from approximately 100 meters up stream to about 400 meters downstream from the railroad bridge is contained in a man made channel(s) cut through a formation of sound rock. At the railroad crossing, the stream is confined to one channel. About 25 meters down stream, the channel is divided into two channels about 8 meters wide and 20 meters deep with vertical side slopes. These two channels are divided by a triangular shaped separation approximately 400 meters long with a base dimension of about 100 meters. At the proposed crossing of the alignment, the width of separation of the two channels is about 25 meters. The reason for the two channels is unknown. The sides of both channels indicate they pass through the same rock formation and there is no evidence of erosion in either. It is estimated that the length of structure at the proposed crossing will be in the neighborhood of 50 meters.

To accommodate Jisr esh Shugur - Ariha traffic, an interchange is proposed in the vicinity of Km 171.4.

The land between Km 159.0 and Km 162.3 is undeveloped and no disruption of existing building structures will occur.

In the vicinity of Km 163.5, disruption of a number of buildings will be required to satisfy construction at the selected location.

The remainder of the route passes across lands devoted to the production of agricultural products. No removal of buildings are anticipated within these areas.

KM 171.4 to KM 183.7

This section begins at the station where the proposed alignment meets the existing Lattakia to Ariha road approximately 5.5 kilometers southeast of the town of Jisr esh Shugur and ends at a point on the existing road about 1.5 kilometers southwest of the town of Mugambil. Throughout this section, the alignment follows the existing road corridor and, where possible, provides for incorporating the existing road platform into the new facilities.

The beginning point of this section, Km 171.4, of the proposed alignment is located on the west side of a north/south range of rocky hills which bisects the northern end of El Gahab Valley. From this point, the proposed alignment passes around the southern end of these hills at their base near three small villages, and then extends northeasterly across the east side of El Gahab Valley to the foot of the Zaoniye Mountains.

Between Km 171.8 and Km 179.2, the proposed alignment is separated from the existing road on the south side to avoid displacement of building structures. It is proposed that existing road between these stations be retained to accommodate local traffic of the villages and other development of the area.

At Km 172.8, a grade separation is proposed to maintain cross traffic flow along the existing road from the southwest which passes under the railroad near this point.

To provide access to and from the existing road at the east end of this section, an interchange is proposed at Km 179.0.

Between Km 179.2 and Km 183.7, it is proposed that the new alignment follow the existing route with expansion for the improvements on the southeast side.

There are no built-up areas or existing structures along this section of the alignment.

At about Km 180.6, an interchange is proposed at the intersection of the existing road which provides access to the villages and developed areas to the north.

At Km 182.1, a relatively new structure exists to pass traffic over the railroad. It is proposed that this railroad overcrossing be retained for west bound traffic and a new structure be provided for eastbound traffic.

To provide freeway access for the town of Mugambil at the foot of the Zaoniye Mountains, an interchange is proposed in the vicinity of Km 183.7.

Between 171.4 and 183.7, existing elevations vary between about 200 and 290 meters. Gradients of 3.5% or less for the new facilities are possible throughout this section without difficulty. In addition, it is possible to achieve a horizontal alignment with curvature based on minimum radii of 675 meters without extraordinary costs.

Except for the built up areas noted above, land use along the route is devoted to the production of agricultural products. The proposed alignment

offers the best location for the expanded facilities with minimum dislocation and disruption of development within the area.

KM 183.7 to KM 189.8

This section of the recommended alignment extends from the interchange proposed to serve Mugambil from the west, at approximate elevation 265 meters, to the interchange proposed to serve Mugambil from the east, located at the western rim of the Zaoniye Mountains at elevation 535 meters. The alignment circumvents the existing route, from the valley floor to the rim of the mountains, about one kilometer north of the town of Mugambil. The proposed route for this section was found to be the most practical in terms of length, alignment and degree of disruption of developed lands. The vertical grade between elevation 280 and 535 meters is a constant 6% for a distance of about 4.3 kilometers. The remaining portion of the section will have grades of 3.5% or less. The alignment incorporates one curve with a 425 meters radius which will limit maximum travel speed for about one kilometer. All other curves throughout the section are based on radii of 675 meters or greater. The greater part of this section of the alignment passes over undeveloped land. Developed land required for construction includes areas devoted to production of agricultural products and orchards located between Km 184.2 and Km 187.0; and between Km 188.2 and Km 189.5. No removal of existing building structures will be required throughout this section.

Based on available geological information, the materials between Km 187.0 and Km 190.8 are primarily weathered limestone formations which when excavated will break into sizes too large for embankment construction without prior processing. Therefore, the alignment for this section is based on minimum

embankment. Excess materials which will result from excavations within this area will not be wasted. The materials are suitable for processed subbase for construction across the valley where available materials for such purposes are minimal.

No major roadway structures, except those to satisfy interchange requirements at the beginning and at the end of the section, will be required. It should be noted that a number of possible routes for this section were investigated including possible realignment of the existing road. The contract for the studies specify that the routing be via the town of Mugambil and end at Ariha. Therefore, it was concluded that all investigations for this section must begin reasonably close to the west side of the town. All areas studied for possible location of this section of the route, both to the north and south would not only involve construction requirements similar to those of the selected alignment but would be considerably longer without resulting in any additional benefits. It was found upon examination of the existing road that grades could not be improved within desirable ranges without lengthening the route. This together with the need for upgrading curvatures to acceptable standards would require a magnitude of construction effort in excess of that required by the selected route.

KM 189.8 to KM 199.5

This section of the recommended alignment follows the existing road corridor from the proposed interchange to be located east of the town of Mugambil at the rim of the Zaoniye mountains to the end of the Lattakia to Ariha route location study, approximately 1.5 kilometers west of the town of Ariha at the southwesterly terminus of the existing four lane divided highway

to the city of Aleppo.

At approximate Km 194.2, the proposed alignment, is intersected by the road which provides access to the village of Kafar Shelaye approximately two kilometers to the south. In the vicinity of Km 198, it passes north of the town of Aurn Al Jauz and the intersection of the existing road and the access road to the village of Al Bara to the south. No other population concentrations are located along the section.

Vertical alignment of the existing road includes approximately 43 changes of grades which vary between 0.32% and 8.66% along the route with only short sections in excess of 6%. Grades for the greater portion of this section of the existing road are within limits which are adaptable, with adjustment, to the criteria for the new facilities. Gradients for this section of the recommended alignment of 6% or less and grades of 3.5% or less are possible for 7.0 and 2.7 kilometers respectively, without excessive cuts and fills. Horizontal alignment includes 35 directional changes with curves radii varying from 300 to 690 meters. The majority of the curves, and in particular the short radius curves, are located along the first four kilometers of the section. This portion of the existing road is located on the north side of a wide gentle sloping ravine which alignment includes a number of compound, broken back curves and short tangented successive curves to conform to irregular topographic conditions. Although the radii of curves for the remaining portion of the road are relatively short, most of the alignment changes are small and the tangents large. With curvature adjustments this portion of the existing alignment is readily adaptable to project alignment standards. Between Km 189.8 and approximately Km 193.5, two alternate alignments are available:

(a) realignment of the existing road to four-lane standards and; (b) dividing the alignment into two. 2-lane roadways, one roadway being provided by realignment of the existing road and the other being provided by a new alignment along the south side of the paralleling ravine. From a construction cost standpoint, both alternates appear to be approximately equal,

Alternate (a) will require realignment of the existing road with construction primarily restricted to the north side and involve substantial cuts and fills. The maintenance of uninterrupted traffic movement through, the area during construction will be difficult. Because of topographic conditions, it would be costly to provide separate bypass routes. Traffic would have to be routed through the construction area causing conflicts with construction operations.

Although alternate (b) requires a new roadway, it offers alignment flexability for minimizing earth movement costs and provides a means for free movement of traffic through the area during construction.

Except for a few locations of individual buildings, built up areas along the existing road are concentrated at the intersection of the road to the village of Kafar Shelaye and at the village of Aurn Al Jauz in the vicinity of the proposed alignment stations Km 194.2 and Km 197.0 respectively. The majority of the land between Km 189.8 and 193.8 is undeveloped. Those areas which are developed are small plots of row crops. Between Km 197 and Km 199.5, development is mainly confined to fruit and olive orchards. Two power pole lines parallel the north side of the road from Km 189.8 to Km 193.5. Between Km 193.5 and Km 197.5, the two power pole lines are located on the south side of the road. From Km 197.5 to Km 199.5, one power pole line is located on each

side of the road. From approximately Km 198.0 to Km 199.5, a power transmission line parallels the road about 15 meters to the south. Only two major roadway structures are proposed throughout the section; (a) a grade separation structure with limited on and off freeway movements at the road serving the town of Kafar Shelaye in the vicinity of Km 194.0; and, (b) an interchange to serve the town of Aurn Al Jauz at approximately Km 196.5. No interchange is proposed to serve the town of Ariha. Such facilities presently provided on the existing four-lane divided highway approximately 2 kilometers northeast of Km 199.5.

ALTERNATIVE ROUTE STUDIES

Initial investigation began by assembling and reviewing all available mapping and existing transportation reports for the project corridor. Available mapping of the area included:

1:25,000 scale topographic map coverage of areas from Km 100 (the station selected to designate the beginning of the recommended route) to Km 137.2, and from Km 155.4 to Km 199.5 (the end of the recommended route);

1:5,000 scale map topographic coverage of the existing Lattakia to Ariha road from its western terminus to Km 163; and

1:50,000 scale topographic map coverage of the entire study area.

Ministry of Communication (MOC) officials in Damascus and Lattakia were consulted and contact was made with regional and local planners to insure that the selected alignment was compatible with development and expansion plans within the project corridor.

Frequent field investigations were made during prosecution of the work to obtain first hand knowledge of possible areas of conflict and to evaluate field conditions.

The recommended alignment reflects a joint effort of all study team disciplines. During progress of the work, inputs and reviews were continually provided by the geologist, the soils engineers and the environmental engineer to evaluate and avoid potential alignment problems.

Possible alternative routes investigated are discussed below.

Alignment variations of the selected route are described in the section entitled "Location Description".

For ease of reference, the stations noted correspond to those shown on the plans of the recommended alignment.

EXISTING HIGHWAY ROUTE

The present route from Lattakia to Ariha is a two-lane asphaltic concrete surfaced road approximately 110 kilometers in length with a general southwest to northeast orientation. About 1.5 kilometers southwest of the town of Ariha, the road joins the western terminus of the recently completed four-lane divided highway which extends seventy-five miles northeast to the City of Aleppo; the second largest city of Syria. Beginning, at its western terminus at the southeastern edge of Lattakia, the existing route follows Al Kabir Al Shamaly River for approximately 37 kilometers to the village of Khaneej Jaonz. At this point Al Kabir Al Shamaly River turns north and the road continues in a northeasterly direction along the Awaysat River. About midway between Lattakia and Ariha, the road passes over the ridge line of the Al Nusayriyah Mountain range west of the town of Jisr esh Shugur.

The gradient of the first one-half of the existing road corridor can generally be described as rising uniformly from an approximate elevation of 10 meters at Lattakia to about 490 meters at the ridgeline. From the ridgeline, the road descends along the eastern slopes of the Al Nusayriyah Mountains to the town of Jisr esh Shugur through a vertical height of approximately 300 meters in a travel distance of about six kilometers. From the town of Jisr esh Shugur, the route runs southeasterly for approximately 6.5 kilometers

across the western side of El Gahab Valley to the southern end of a south to north rocky hill range which divides the northern end of the valley. Circumventing the southern end of these hills, it then extends northeasterly for approximately seven kilometers across the eastern side of the valley to the town of Mugambil, located at the foot of the western slopes of the Zaoniye mountains. The topography of the route corridor throughout this section is relative uniform with elevations ranging between 150 and 300 meters. From the town of Mugambil, the road rises up the western slopes of the Zaoniye Mountains through a vertical height of approximately 370 meters to their rim in a travel distance of about 7.25 kilometers. From this point, the road extends for 9.5 kilometers in a general northeasterly direction through high plains of the Zaoniye Mountains to the town of Ariha passing through the town of Aurn Al Jauz about 3.5 kilometers west of Ariha. The area is characterized by rolling hills with elevations ranging between 590 and 690 meters.

Land along the existing route except where it passes through towns or villages, consist primarily of: areas devoted to the production of agricultural products; orchard areas; forestry areas; areas unsuitable for development; and, minor areas of wayside commercial establishments to serve transit trade. Irrigated crop lands are mainly found in the coastal plains, El Gahab Valley, and in the stream valleys and plateau areas. The majority of land in the foothill areas and the high plains areas are devoted to olive and fruit orchards. Areas of severe or erratic topographic features, especially within Al Nusayriyah Mountains, are for the most part undeveloped but do contain some limited areas of recreational and commercial uses.

The existing road serves a variety of types of traffic ranging from multiple axled truck-trailer combinations, to buses, to conventional automobiles, to animal-drawn carts and pedestrians.

The surface of the road covers a full range of conditions from good to poor, the majority of which can be classified from fair to poor by project standards.

For the most part, the magnitude of gradients of the road are within acceptable limits but include numerous changes occasioned by topographic conditions; however, the horizontal alignment for the greater part is poor, making stopping and passing conditions hazardous. This probably resulted from adoption of alignment criteria to minimize costs associated with excavations, embankments and physical obstructions and still satisfy basic transportation needs. Regardless of present alignment conditions, the existing road corridor offers a desirable general location for approximately one-half of the length of the new facility. The sections of the recommended alignment involved are as indicated on the plans and include: Km 125.8 to Km 149.8; Km 153.3 to Km 159.0; Km 171.0 to Km 183.8; and, Km 189.7 to Km 199.5. Although the remaining sections of the existing road were also investigated for possible improvement and incorporation into the proposed facility, they were found unacceptable for a variety of reasons. These sections and the reasons for rejection are summarized as follows:

1. Existing Road between Km 100 and Km 125.8 - As indicated and discussed in a later section, alignment investigations resulted in two alternative routes to replace this section; one of which (Alternative B) does incorporate a portion of the existing road. Two major factors influenced studies for relocation of this section.

a. Approximately the first six kilometers of the existing road passes through the area designated for industrial development for the city of Lattakia. According to the pending Master Plan for Lattakia the limits of this area encompasses all of the lands lying between the base of the hills north of the road and the river banks south of the road. There are a number of industrial establishments presently located along the road in this area indicating a trend toward development of the area consistant with pending Master Plan land use. The width of the land strip between the existing plants and the railroad paralleling the road on the south is too restrictive for development of a route to limited access expressway standards without disruption of these existing facilities. Even considering possible acquisition to provide additional right-of-way along the existing route, a limited access facility through the area will undoubtedly disrupt and impede the area development patterns envisioned. Also, development of the area for industrial use bisected by a freeway will create local traffic circulation problems with costly solutions.

In addition; it may be desirable in the future to provide rail spurs to serve the area industrial complexes. To accomplish this with the railroad parallel to, and in close proximity to, a freeway type facility would require costly construction alterations to both the railroad and highway. In consideration of such factors, it was concluded that the use of the existing road corridor in this area is neither in the best interests of the highway development nor realization of the pending Master Plan concepts for the city of Lattakia.

b. At present, the Haffe Dam is planned for construction on Al Kabir Al Shamaly River approximately 20 kilometers northeast of the city of Lattakia.

The ultimate pool elevation, considering allowances for freeboard, is estimated to be in the neighborhood of 105 meters. Consequently, approximately six kilometers of the existing road downstream from about Km 125 will be inundated (as indicated on the plans).

2. Existing Road between Km 149.8 and Km 153.3 - Possible incorporation of the existing road alignment with modifications in accordance with project criteria was examined. Because of the magnitude of alignment revisions which would be required, and the dislocation of developed properties involved, it was concluded that a shorter new route to replace this section of the existing road offered more flexibility in achieving an alignment of higher standards without appreciable difference in cost.

3. Existing Road from Km 159 to Jisr esh Shugur - Curvature of this section of the existing road is excessive and can not be upgraded to the degree required to meet minimum project standards.

4. Existing Road from Jisr esh Shugur to Km 171 - A new route to replace this section of the existing road was influenced by the following factors:

a. The need for a short route to traverse the western slopes of Al Nusayriyah Mountain to El Gahab Valley in the vicinity of Jisr esh Shugur;

b. The need for a route location readily acceable to Jisr esh Shugur users but sufficiently removed to allow maximum flexibility and freedom for planned expansion and development of the town; and

c. the need for an alignment offering the most favorable conditions for location of a structure across Al Aassi River.

None of these location conditions could be fully satisfied by use of the existing road corridor.

5. Existing Road between 183.7 and Km 189.7 - Alignment of the section of the existing road between these two stations is poor and cannot be practially or economically adjusted to conform to minimum project standards.

DISCUSSION OF ALTERNATIVES FOR SEGMENTS OF THE EXISTING ROAD

In general, the existing road follows the most direct route between Lattakia and Ariha via the town of Jisr esh Shugur and Mugambil considering physical restrictions and obstacles. For those portions of the alignment where use of the existing road corridor is recommended, efforts to find alternative locations independent of the existing road (within economical construction paramenters) were unfruitful. The attached general plan of the area indicates the recommended alignment and alternate locations studied for those portions of the existing road not recommended for upgrading to project standards.

The following is a discussion of these alternatives and factors which influenced the final route selection.

1. KM 100 to KM 125.8

Two alternative alignments for relocation of approximately the first 25.8 Kilomenters of the existing road were developed for analysis. Alternate "A-1" the one found most favorable by analysis is discussed under the section entitled LOCATION DESCRIPTION. A description of Alternate "B-1" is as follows:

The geometrics of Alternate "B-1" are based on design standards for 120 Km/hr travel speeds. The selected alignment is considered the best location based on land use, land availability and degree of physical limitations. The western termunus of Alternate "B-1", designated as Km 100, is approximately 0.35 Km west of the Lattakia to Aleppo railroad structures which

overpasses the existing Lattakia to Tartous road at the outskirts of Lattakia. It ties to the Lattakia arterial road system and the proposed new Tartous to Lattakia expressway route at an interchange proposed between the above referenced railroad structure and the existing intersection of the roads from Ariha and Tartous in the vicinity of the existing access road to the southern end of the port area.

From this point of beginning, the alignment follows a general northerly course for about 0.6 Kilometers to the northwestern side of the existing Lattakia to Ariha road. At this point, it turns northeasterly and extends on a course which bypasses the existing and planned industrial areas along the existing road.

At Km 109.5, the alignment crosses from the northwest side to the southeast side of the existing road and subsequently crosses Al Kabir Al Shamaly River at Km 111.1 approximately three kilometers downstream from the existing road crossing. It is estimated that the bridge structure at the proposed crossing will be approximately 60 meters in length.

The selection of the proposed river crossing was influenced by: length of structure required; the most favorable alignment crossing conditions based on the most desirable locations of those sections before and after the crossing; and, reductions of overall route length which could be achieved.

From the proposed river crossing, the alignment extends in a northeasterly direction along the southeast side of Al Kabir Al Shamaly River to its intersection with the existing road at about Km 115.

Between Km 115.0 and Km 121.5, Alternative B-1 generally follows the existing road alignment introducing curvature with greater radii and longer tangent sections.

At Km 121.6, the alignment passes over the railroad and extends to the northeastern terminus of this Alternative at approximately Km 123.25.

Terrain along the proposed route varies from relatively flat river valley lands to rolling hill areas. Topography gradients along the route are gentle with a general uniform rise in elevation between 10 meters and 230 meters.

Major roadway structures along the proposed route include six interchanges, two grade separations, one bridge river crossing and one railroad overcrossing.

The following is comparative data for the two alternate routes used for economic evaluation and selection.

		Alternate "A-1"	Alternate "B-1"
1)	Total Length	20.35 Km	23.15 Km
2)	Distance between beginning points of the two alternates	2.05 Km	2.05 Km
3)	Number of Interchanges	3 each	6 each
4)	Number of Grade Separations	4 each	2 each
5)	Number of Bridge Structures	1 each	1 each
6)	Number of Railroad Crossings	---	1 each
7)	Grades		

%	(+)	(-)	%	(+)	(-)
0.4	3.35 km	-	0.3	2.70 Km	-
0.6	2.10	-	0.4	1.70	1.25 Km
1.0	2.00	-	0.5	1.85	-
1.2	1.65	-	1.0	1.45	2.00
1.3	2.25	-	1.4	1.69	-
1.5	-	0.50	2.0	4.21	-
2.0	1.40	0.70	2.7	2.80	-
2.5	1.55	-	2.8	-	1.95
2.8	-	0.80	3.0	1.55	-
3.3	-	0.70			
3.4	0.85	-			
3.5	2.50	-			

12)	Curvature	All radii greater than 675 meters	All radii greater than 675 meters

The estimated user cost for operation over the full length of the alternative routes is as follows:

Vehicle Type	Alternative	
	A-1	B-1
	(L.S./Veh)	(L.S./Veh)
cars	3.48677	3.96684
pickup trucks	4.1716	4.74453
buses	18.3871	21.00086
Trucks (single units)	19.26627	21.98647
Trucks (combination	17.56948	19.93396

The estimated traffic over the alternatives, by vehicle type, is as shown in the following tabulation:

Vehicle Type	ADT '84	Growth rate (%)	
		84-93	94-2003
cars	699	8.7	6.2
pickups	385	6.9	5.5
buses	320	8.1	6.1
trucks (S.U.)	980	6.9	5.5
trucks (comb.)	156	6.9	5.5

The estimated net value of user costs over the alternatives is shown below for 3 discount rates.

Alternative	Discount Rate		
	10% ('000 L.S.)	15% ('000 L.S.)	20% ('000 L.S.)
A - 1	175,713	121,779	90,496
B - 1	200,371	138,868	103,195
Advantage	24,658	17,089	12,699

From the above it can be clearly seen that A-1 is the preferred alternative.

KM 165.0 to KM 174.0 (ALTERNATE "A" STATIONING)

As indicated on the plans, two alternate alignments were developed for routing the expressway across the west side of El Gahab Valley south of the town of Jisr esh Shugur. Alternate "A-2," the one considered most favorable by analysis is discussed under the section entitled LOCATION DESCRIPTION. The following is a discussion of Alternate "B-2."

Design standards used for analysis of Alternate "B-2" are the same as those used for Alternate "A-2"; i.e. geometrics for travel speeds of 120 Km/hr. As noted in the included listing of comparative data for the two alternates, the two routes have similar characteristics with respect to gradients, curvature, and type and number of major roadway structures. The principal difference between the two routes is the length - 9.00 kilometers for Alternate "A-2" versus 7.75 kilometers for Alternate "B-2." Although Alternate "B-2" is 1.25 kilometers shorter in length, it considered less desirable than Alternate "A-2" for the following reasons:

a. The size of major roadway structures would be larger than those required for Alternate "A-2." It is estimated that length of bridge crossing of Al Aassi River (Km 168.35) would be about 80 meters. In addition, erosion protection of the river section through the crossing may be necessary because of foundation conditions and soil characteristics. At the proposed railroad overpass (Km 171.7), the railroad is on fill. Consequently, more extensive approach fills and length of structure will be required than for the railroad crossing of Alternate "A-2."

b. It is believed that the existing road south from Jisr esh Shugur will become the principal access route from the expressway to the town (and the

sugar plant located along the road) for traffic between Jisr esh Shugur and Ariha. The travel distance along this access route is approximately 2.5 kilometers longer from Alternate "B-2" than from Alternate "A-2".

Land use along the proposed location of Alternate "B-2" is devoted to the production of agricultural products similar to Alternate "A-2." No displacement of buildings or structures will be necessary.

(KM 165 to KM 174 - ALTERNATIVE A-2, B-2)

		Alternate "A-2"			Alternate "B-2"		
1)	Total length	9.0 Km			7.75 Km		
2)	Existing Road - Jisr esh Shugur to proposed alignment	5.0 Km			7.50 Km		
3)	Interchange	2 each			2 each		
4)	Grade Separation	1 each			1 each		
5)	Railroad overcrossing	1 each			1 each		
6)	Bridge crossings	1 each			1 each		
7)	Gradients	%	(+)	(-)	%	(+)	(-)
		0.50	0.62 Km	1.53 Km	0.50	1.90 Km	-
		0.75	-	0.50	1.50	1.31	-
		0.80	0.70	-	1.60	-	1.60 Km
		1.00	1.80	1.30	2.00	-	0.50
		2.00	-	0.50	3.50	1.24	1.20
		3.23	-	0.95	-	-	-
		3.50	1.10	-			
8)	Curvature	All radii greater than 675 meters			All radii greater than 675 meters		

The estimates user cost for operation over the full length of the alternative routes is as follows:

Vehicle Type	Alternative	
	A-2	B-2
	(L.S./Veh)	(L.S./Veh)
cars	1.54271	1.32744
pickup trucks	1.84245	1.5896
buses	8.0287	7.12633
trucks (single unit)	8.45415	7.42751
trucks (combination)	7.60543	6.76209

The estimated traffic over the alternatives, by vehicle type, is as shown in the following tabulation:

Vehicle Type	ADT '84	Growth rate	
		1984-93	1993-2003
cars	615	8.7	6.2
pickups	495	6.9	5.5
buses	168	8.1	6.1
trucks (S.U.)	912	6.9	5.5
trucks (comb.)	166	6.9	5.5

The estimated net value of user costs over the alternatives is shown below for 3 discount rates.

Alternative	Discount Rate		
	10% ('000 L.S.)	15% ('000 L.S.)	20% ('000 L.S.)
A - 2	67,387	46,747	34,767
B - 2	59,164	41,043	30,525
Advantage	8,213	5,704	4,242

From the above it can be seen that the user cost advantage of alternative B-2 is clear; however, the advantage is within the range of values that could be offset by differences in construction cost. It is therefore necessary to consider the relative construction cost of the two alternatives in order to make a selection of recommended alternative.

Part V

ENVIRONMENTAL

ENVIRONMENTAL

SYNOPSIS

This enviromental investigation and analysis is based on the need to know how the proposed project would effect the relationship between man and his physical and cultural environment.

The preliminary evaluations are based on interviews with concerned Syrian officials and an extensive field investigation. Input from other project team members includes data from the disciplines of agricultural, industrial, transportation and tourism economists as well as location, soils, and transportation engineers.

The proposed alignment (Alternative A) appears to have the least adverse environmental impact of any of the alternates studied. The benefits derived from the vastly improved transportation facilities appear to exceed the detrimental effects by considerable degree.

The general travel corridor was studied to determine the major areas of impact that would occur if a new highway facility were constructed. Subsequently several alternate alignment variations were examined in more detail. Each alternative under consideration was evaluated to determine both the beneficial and detrimental effects of the construction of the facility. Alignment adjustments were made in several instances to avoid or reduce adverse environmental impacts. This method of analyses was used throughout the preliminary alignment development process in order to select a highway location that would most nearly satisfy both environment and engineering criteria.

This preliminary environmental assessment has revealed no serious adverse impact which should prevent approval of the proposed alignment for

detailed design and construction. The "no-build" alternate does not appear to be a reasonalble consideration.

HISTORICAL ARCHAELOGICAL

One of the most important environmental aspects of this investigation and the one which Syrian officials have expressed most concern is the wealth of archaeologic and historic remains which are present in the area. It has been said that all of Syria is a potential archaeological tell. (Tells are small hills or mounds made up of the accumulated remains of ancient towns). This is not far from the truth and as a result preliminary archaeological investigations have been extensive. Many known sites have been located and examined and field investigations were conducted to reveal any possible unknown sites with which the newly constructed roadway might interfere.

Discoveries made at the site of Lattamneh on the Orontes River and in the caves near Palmyra show that human activities began in Syria more than half a million years ago. Excavations made in the Lattakia region testify to the presence of man as early as the bronze age. Evidence of this was discovered at tell Ibn Hani and at Ugarit a few kilometers north of Lattakia.

During the second millenium Syria became a politically and culturally active center and was involved in large scale international conflicts. Aleppo, Ugarit (Ras Shemra) and Mari on the Euphrates River were the hub of events during this period.

Ugarit, inhabited since the second millenium became an independent Kingdom during this time under the Cannaanites, better known under their Greek name, the Phoenicians. These people whose principle activity was sea-

faring for commercial purposes, established numerous towns along the coast of Syria, and developed that area as one of the most prosperous in the country. Prosperity enabled them to advance in arts and intellectual life. It is not astonishing that the first alphabet was discovered at Ugarit.

The town of Ebla, sixty kilometers south of Aleppo, was discovered only recently and its tablets, not yet entirely deciphered, will undoubtedly revolutionize the history of that period.

Such great towns as these could not have existed alone. Both are of considerable size and could have been populated by as many as 30,000 people each. Both were at one time the capital of an independent kingdom. The fact that many satelite towns must have sprung up along the communicatons roads from the coast and inland toward Ebla is attested to by many tells not yet excavated which can be seen from the road.

After the invasion by Alexander the Great in 333 B.C. it was only natural that the Greeks would choose the coast to establish their most important towns, as it was situated closest to their own country. These people, the Romans and the Byzantines after them created many sites in this region. The actual town of Lattakia came to life during this period. Unfortunately little is known of these towns as all were burned during the Persian invasion at the end of the Byzantine empire and were never excavated.

Centers of importance shifted drastically toward Greece after the Islamic conquest and no important towns are thought to have been built. Nothing can be expected to be discovered except for the towns which existed before this period.

The existing road as well as the proposed new alignment between Lattakia and Ariha follow what was probably the ancient route between Lattakia, Ebla and Aleppo. The remains of this ancient route, though not well preserved,

can still be seen at some locations. The remains of a Roman aqueduct and tunnel system which carried irrigation water to the Lattakia area from as far as 40 Km away can still be seen in some locations.

Many archaeological teams have worked in this region, particularly in the area where the proposed roadway lies along Al Kabir Al Shamaly River valley and in El Gahab valley near Jisr esh Shugur, but there are still many suspected and known sites which have not been investigated.

During the detailed design and construction phases of this project archaeological teams should conduct detailed investigations of the proposed route to avoid damage to important and irreplaceable archaeological information.

CULTURAL

The Syrian people live in a changing society which is a mixture of ancient customs and a rapidly changing technology designed to keep the country abreast of the industrial world. The proposed expressway in many areas traverses the same routes used by the ancient caravans as evidenced by the remains of the ancient routes discussed earlier.

The effect of the proposed expressway on this life style will be two-fold. The modern transportation modes will benefit greatly and their present rapid growth will be further stimulated. The older traditional forms of transportation which include pedestrian, animal power and more recently light automotive modern modes and may decline at a faster rate.

It is recommended that an adequate number of pedestrian and stock crossing areas be designated in order to maintain current community and religious patterns as well as herding practices.

PHYSICAL FEATURES

The study corridor begins at the outskirts of Lattakia and follows Al Kabir Al Shamaly River for about 6 Km before it enters Al Nusayriyah Mountains. The route passes through these mountains for about 55 Km before crossing the fertile El Gahab valley near the town of Jisr esh Shugur. It then climbs the slopes east of El Gahab valley, crosses a mountain plateau, passes through more heavy mountainous terrain before it ends near the town of Ariha. The total distance is about 100 Km.

The existing route is quite scenic and offers the traveller many magnificent views of the mountains and the cultivated valleys but the alignment is very low standard and the surface condition is, in many areas, poor. The proposed four lane expressway will create much larger cuts and fills but the improved alignment and grades will allow travellers more opportunity to observe and enjoy these vistas than does the present low standard road.

Preliminary air quality estimates show that some increase in vehicle emissions can be expected due to increased traffic volume. However, the emission rate per vehicle should be substantially reduced since vehicles operating at optimum conditions emit fewer pollutants than do vehicles operating on sub-standard roads. It is felt that the project can be said to result in a net improvement in air quality.

Noise levels for any given traffic volumes can be expected to decrease with the use of a new facility. Much of the present noise is due to truck acceleration and deceleration on the existing facility and as in the case of air quality it is felt that the noise levels will be reduced when vehicles are able to operate at more nearly optimum conditions.

NATURAL ENVIRONMENT

Those portions of the study corridor which lie in cultivated lands have been altered by man for agricultural, commercial or residential purposes. In these regions there are few areas which could be considered to be in their natural state. Even in the mountainous areas, which the study corridor passes through, almost every area which is suitable for growing crops or for building has been altered by man. However there are many areas in the steeper mountainous terrain which are in a relatively natural state. Most of these areas are covered by native trees which are predominantly pine.

The portions of the alignment which lie in the inhabited areas will not change the relationship between man and his natural environment. In the mountainous areas the proposed alignment, along much of the study area, follows the existing roadway. In certain areas however, the proposed new alignment will pass through areas of natural mountainous growth. Moderate environmental impact is expected in these areas but it is felt that the benefit of the new facility outweighs the minimal environmental damage that would occur from the construction of this project.

Wildlife in this study area is limited to wild pigs, birds and some small predators such as foxes. Discussions with wildlife officials indicate that in the study area, especially in agricultural areas, they are much more concerned with the quality of human life than with the protection of natural animals and plants. All interviews and investigations have led to the conclusion that there are no known species of animals or plants in the project vicinity which could be considered to be endangered species.

LAND USE

Right-of-way for the portion of the project which lies in El Gahab

valley will be taken from primarily agricultural land. Impact in the land use category in this area is considered severe. Right-of-way for the remainder of the project will primarily be taken from open or forested lands and the impact in this area is considered to be light. Considerable positive benefits to commercial and industrial land uses along the route will be derived from the proposed new facility and commercial truck traffic moving from the Orontes River valley to the coastal ports will benefit greatly.

A preliminary impact evaluation form has been completed for this segment of the project and is included in this report as Figure V-1.

MAN-MADE FACILITIES

Utilities, pipelines, building and other man-made structures have been carefully avoided wherever possible. A few residential structures may be affected but special efforts were made to preserve these groups of buildings such as villages so as not to disrupt traditional community patterns.

FIGURE V-1
PRELIMINARY IMPACT IDENTIFICATION AND EVALUATION FORM

IMPACT AREAS and SUB-AREAS	ENVIRONMENTAL IMPACT EVALUATION
A. LAND USE	
1. CHANGING THE CHARACTER OF THE LAND THROUGH:	
a. INCREASING THE POPULATION	LOW
b. EXTRACTING NATURAL RESOURCES	LOW
c. LAND CLEARING	LOW
d. CHANGING SOIL CHARACTER	LOW
2. ALTERING NATURAL DEFENSES	NONE
3. FORECLOSING IMPORTANT USES	MODERATE
4. JEOPARDIZING MAN OR HIS WORKS	NONE
B. WATER QUALITY	
1. PHYSICAL STATE OF WATER	NONE
2. CHEMICAL AND BIOLOGICAL STATES	NONE
3. ECOLOGICAL BALANCE	NONE
C. ATMOSPHERIC	
1. AIR ADDITIVES	MODERATE
2. AIR POLLUTION	LOW
3. NOISE POLLUTION	MODERATE
D. NATURAL RESOURCES	
1. DIVERSION, ALTERED USE OF WATER	LOW
2. IRREVERSIBLE, INEFFICIENT COMMITMENTS	LOW
E. CULTURAL	
1. ALTERING PHYSICAL SYMBOLS	LOW
2. DILUTION OF CULTURAL TRADITIONS	MODERATE
F. SOCIOECONOMIC	
1. CHANGES IN ECONOMIC/EMPLOYMENT PATTERNS	LOW
2. CHANGES IN POPULATION	LOW
3. CHANGES IN CULTURAL PATTERNS	MODERATE
G. HEALTH	
1. CHANGING NATURAL ENVIRONMENT	LOW
2. ELIMINATING AN ECOSYSTEM ELEMENT	NONE
H. GENERAL	
1. INTERNATIONAL IMPACTS	NONE
2. CONTROVERSIAL IMPACTS	NONE

Part VI

RECOMMENDED GEOMETRICS

RECOMMENDED HIGHWAY ALIGNMENT
Lattakia to Ariha

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Scales

PLAN: 1/25,000 — 0 500 1000 2000m

PROFILE: 1/25,000 HORZ. — 0 500 1000m

1/2,500 VERT. — 0 50 100m

EXISTING GROUND ELEVATIONS ARE IN METERS

TYPICAL SECTIONS: AS SHOWN

Legend

Existing

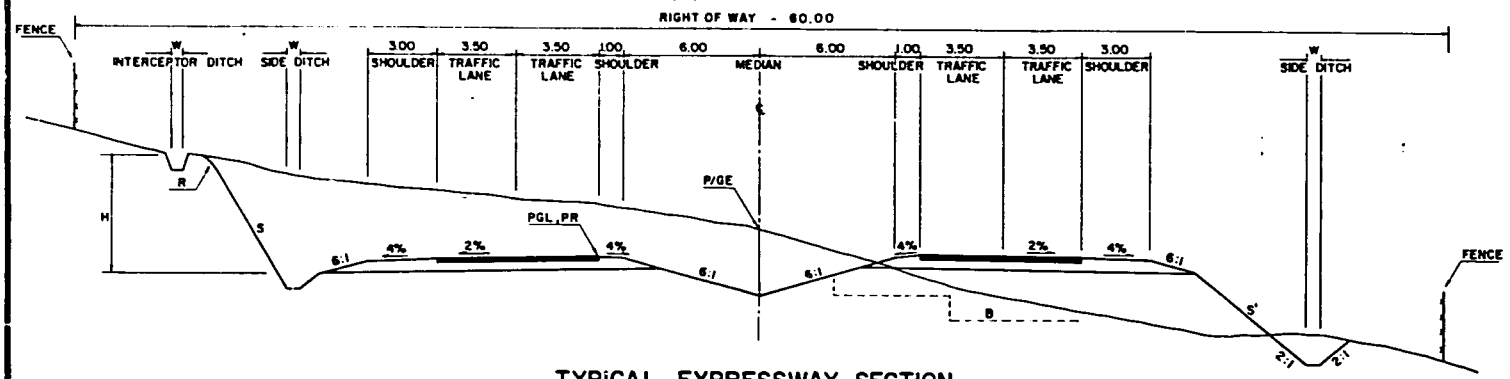
- 50 — CONTOUR
- ROAD CLASS I
- ROAD CLASS II
- ROAD CLASS III
- RAILROAD
- RIVER
- CHANNEL MORE THAN 5m WIDE
- CHANNEL LESS THAN 5m WIDE
- CREEK
- SUBSURFACE CHANNEL
- POWER LINE
- OIL PIPE LINE
- EXISTING GROUND PROFILE

Proposed

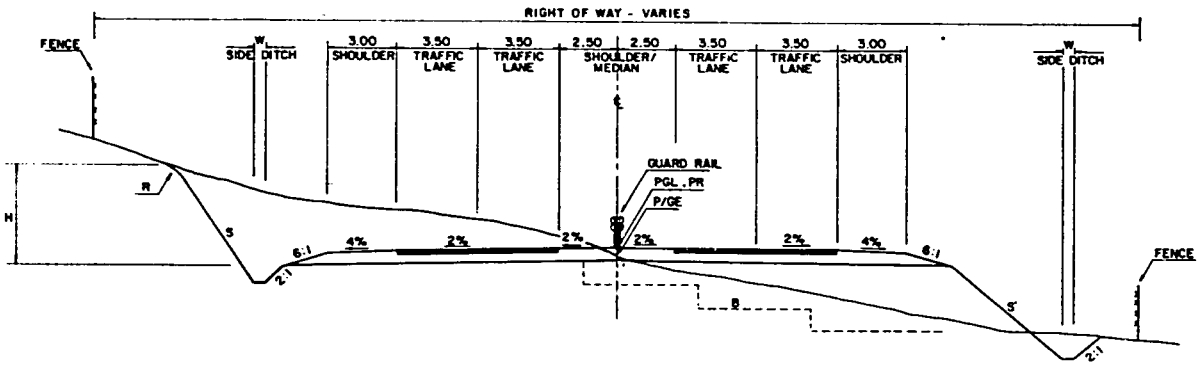
- 124 KM — HIGHWAY AND STATION
- INTERCHANGE
- GRADE SEPARATION
- LIMITS OF FUTURE DEVELOPMENT

LATTAKIA HIGHWAYS STUDY
Syrian Arab Republic

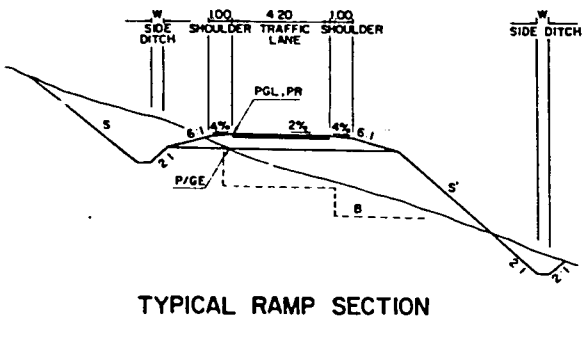
PLATE 1 TITLE SHEET
LYON associates, inc.



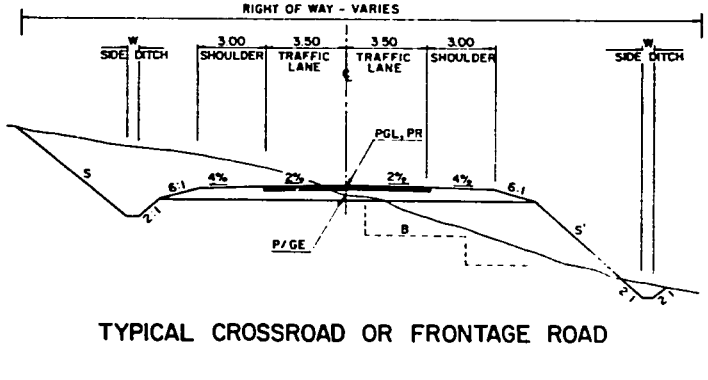
TYPICAL EXPRESSWAY SECTION



TYPICAL EXPRESSWAY SECTION - RIGHT OF WAY RESTRICTED



TYPICAL RAMP SECTION



TYPICAL CROSSROAD OR FRONTAGE ROAD

LEGEND

P/GE	PROFILE GROUND ELEVATION
PGL	PROFILE GRADE LINE
PR	POINT OF ROTATION
W	DITCH WIDTH VARIES
H	HEIGHT OF SLOPE
S	CUT SLOPE VARIES - BENCH REQUIRED FOR $H \geq 4.00$
S'	FILL SLOPE VARIES $H \leq 3.00$, $S' = 4:1$ $H > 3.00$, $S' = 2:1$ (GUARD RAIL REQUIRED)
B	BENCHING AS REQUIRED FOR FILLS
R	SLOPE ROUNDING

NOTES

1. DIVIDED HIGHWAYS WILL BE BIFURCATED WHERE ECONOMICALLY AND TECHNICALLY FEASIBLE TO DO SO.
2. SUBGRADE DRAINAGE WILL BE PROVIDED AS REQUIRED BY GROUND WATER CONDITIONS.
3. ALL DIMENSIONS ARE IN METERS

PLATE 2 TYPICAL SECTIONS

LATTAKIA HIGHWAYS STUDY

LYON associates inc.

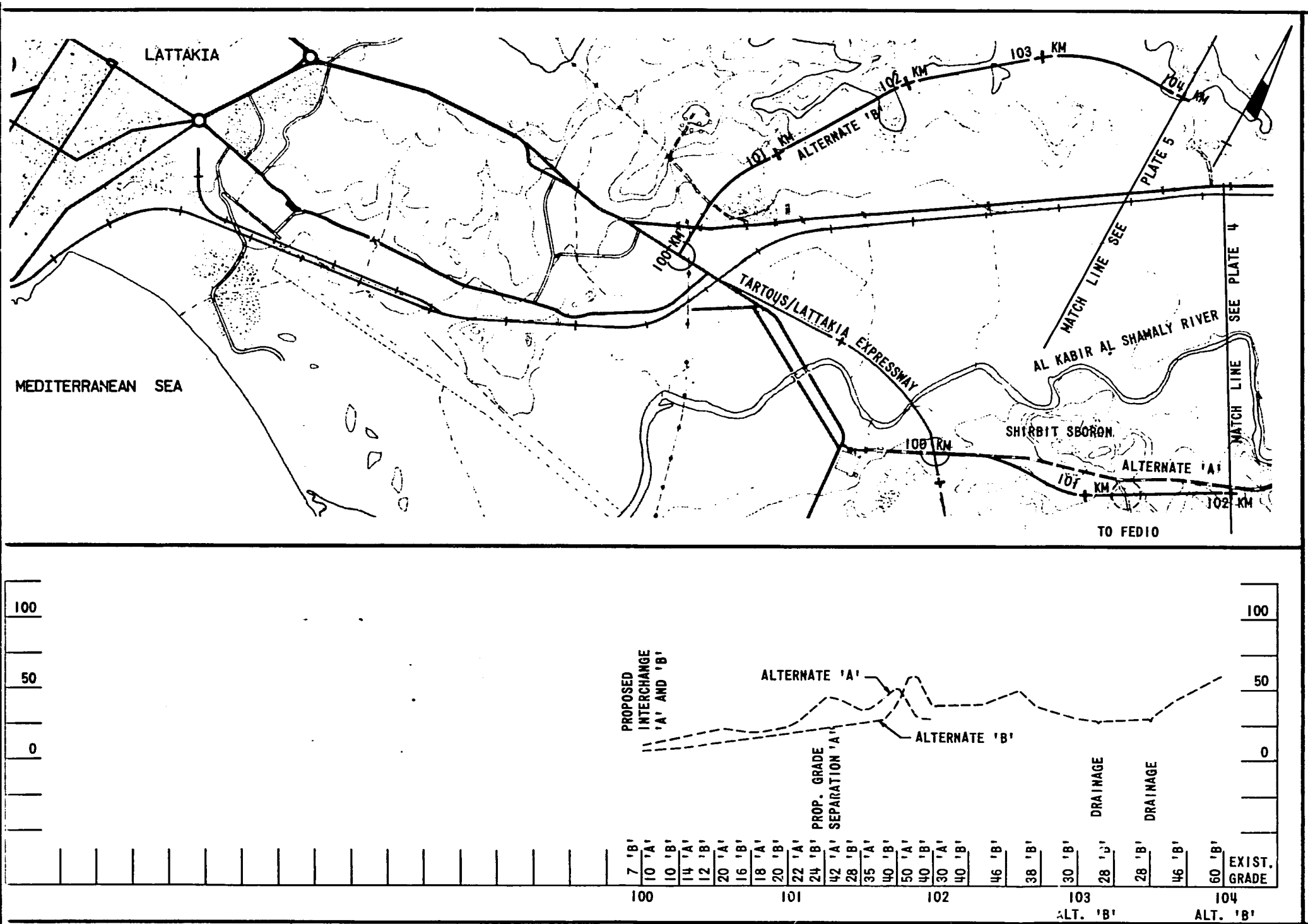


PLATE 3 KM 100 to KM 102 ALT. A 104 ALT. B

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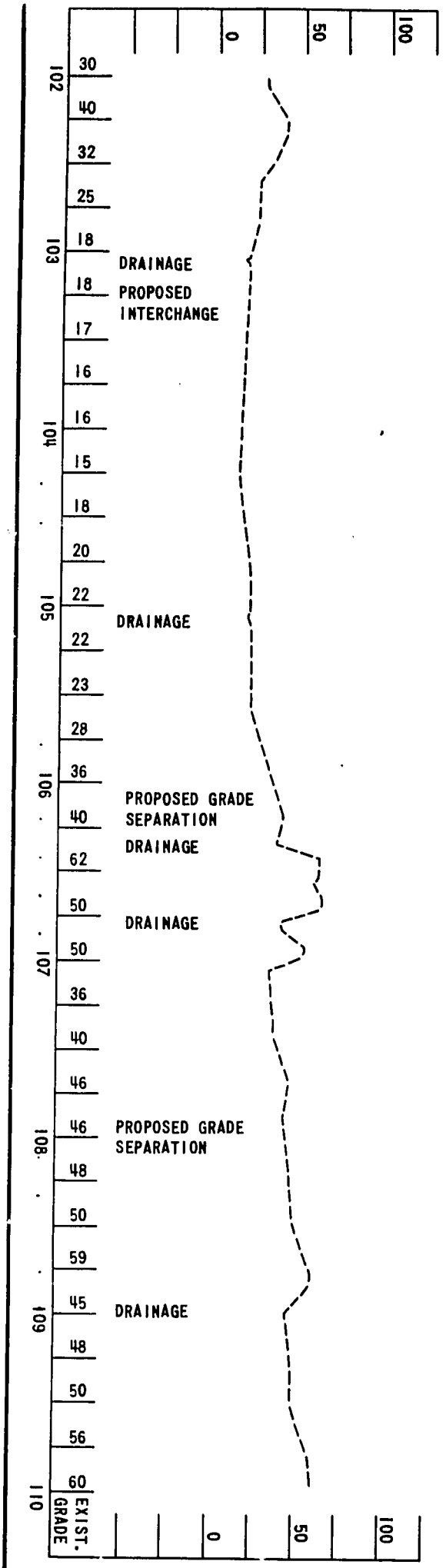
LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



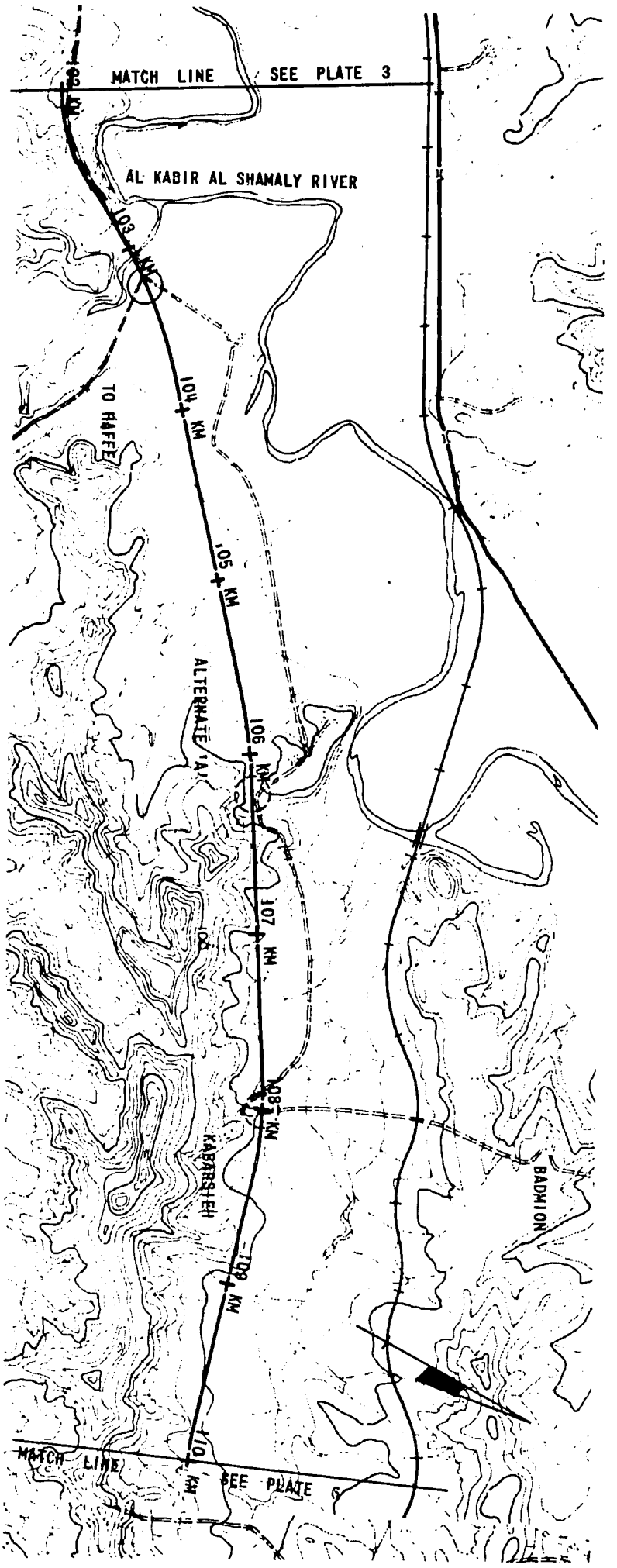


PLATE 4 KM 102 to KM 110 ALT. A LATTAKIA HIGHWAYS STUDY

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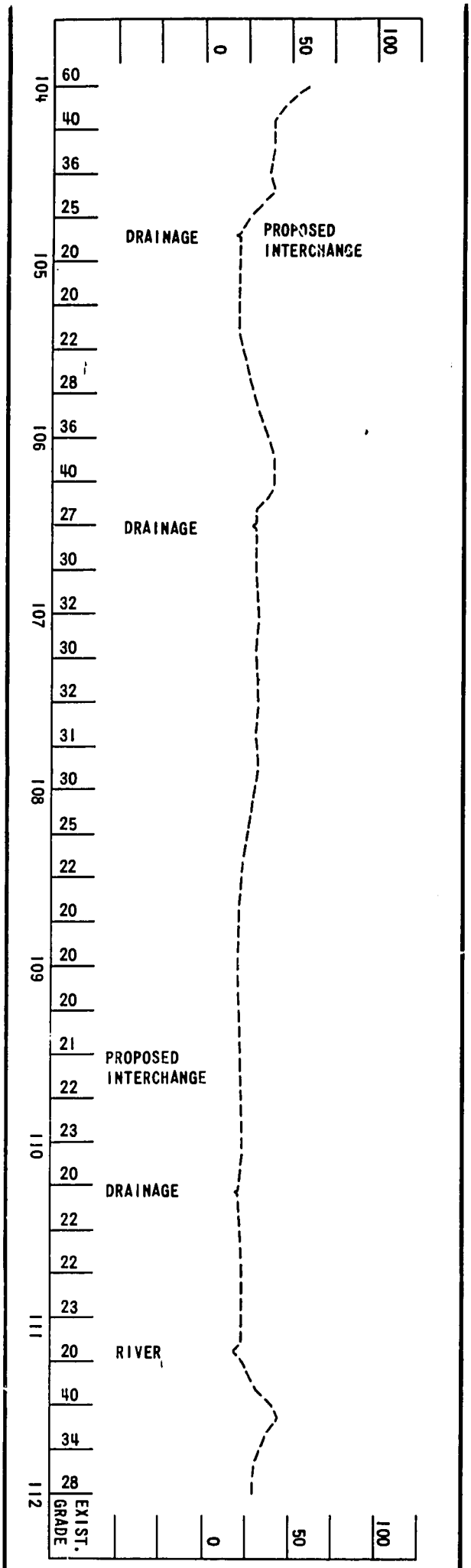

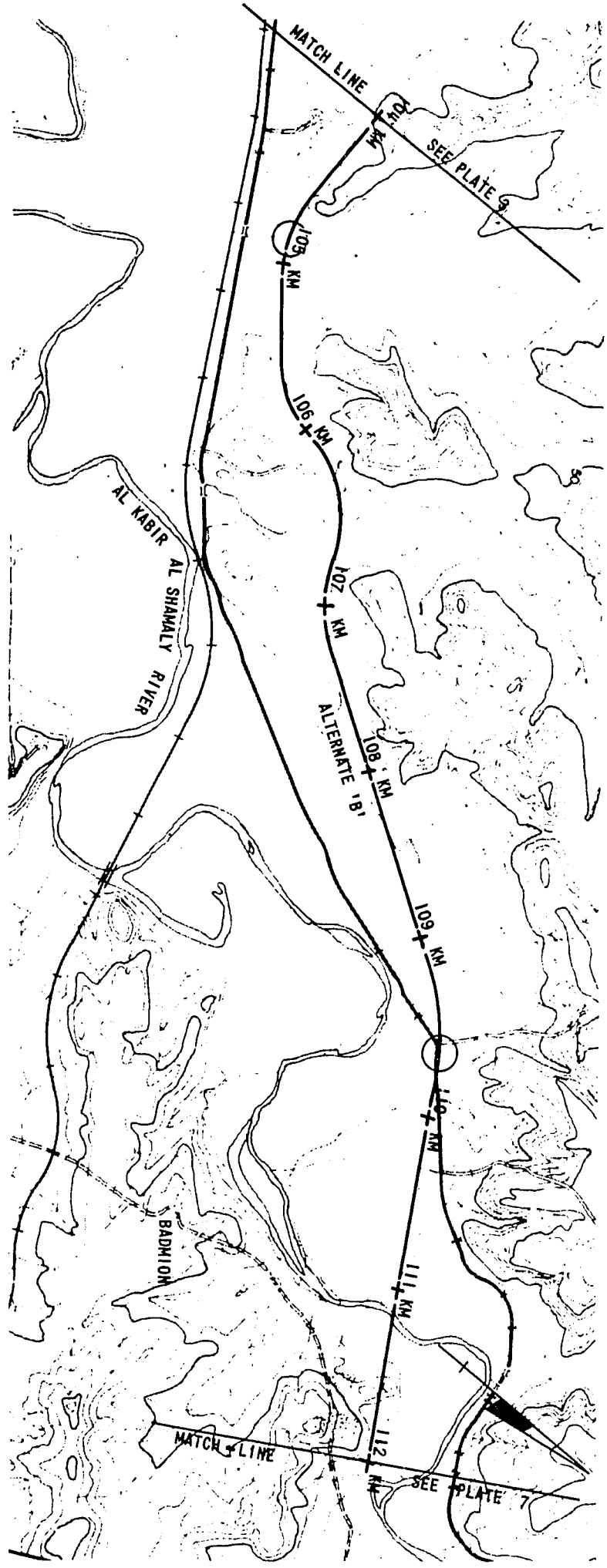

PLATE 5 KM 104 to KM 112 ALT. B LATTAKIA HIGHWAYS STUDY

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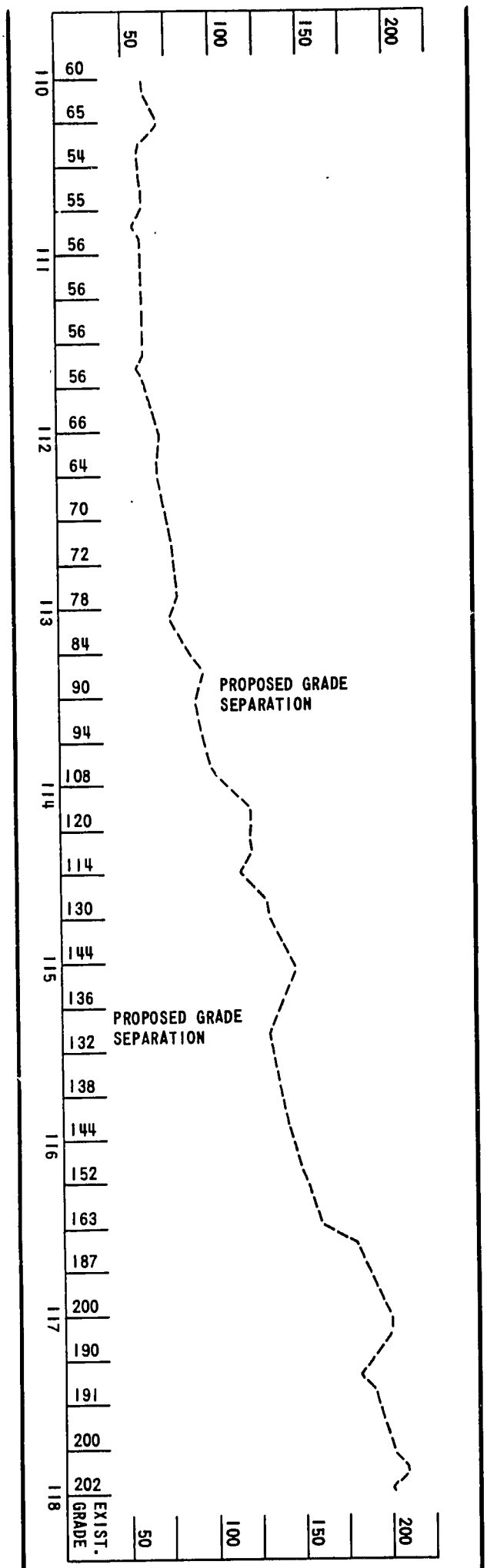

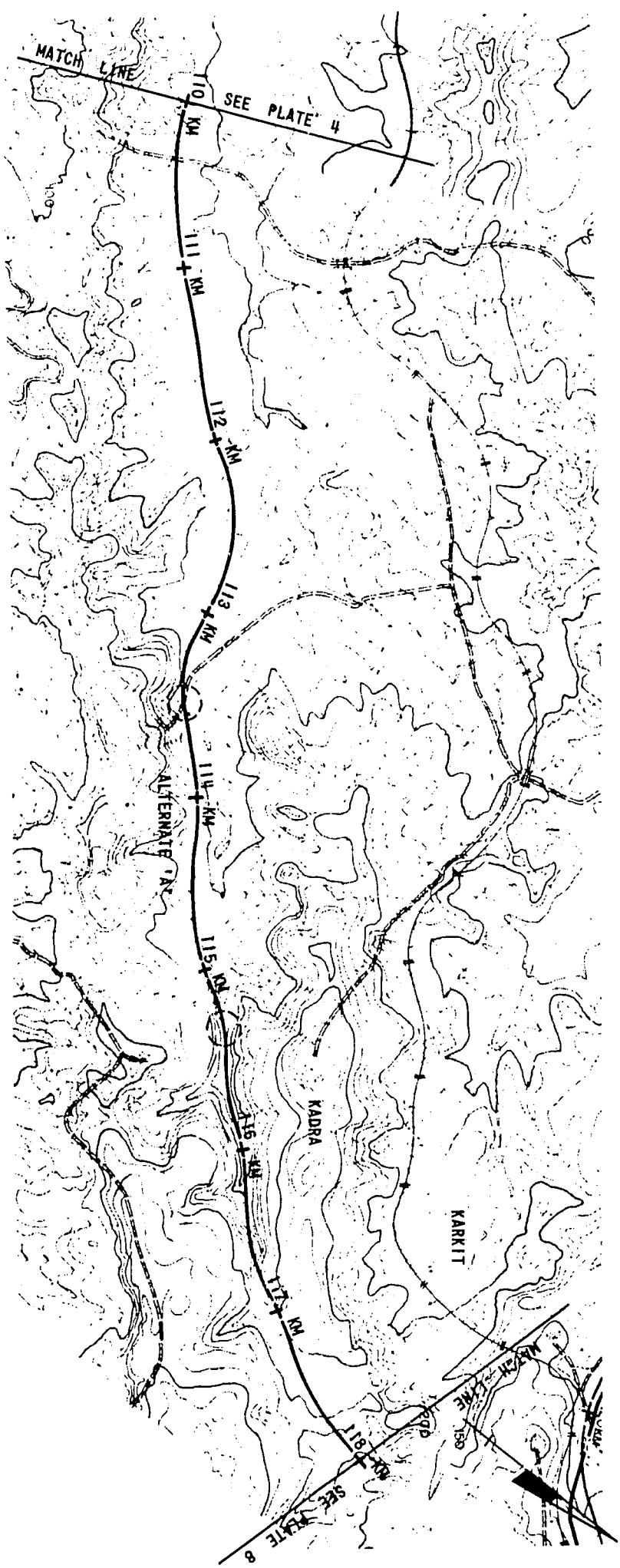

PLATE 6 KM 110 to KM 118 ALT. A

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic

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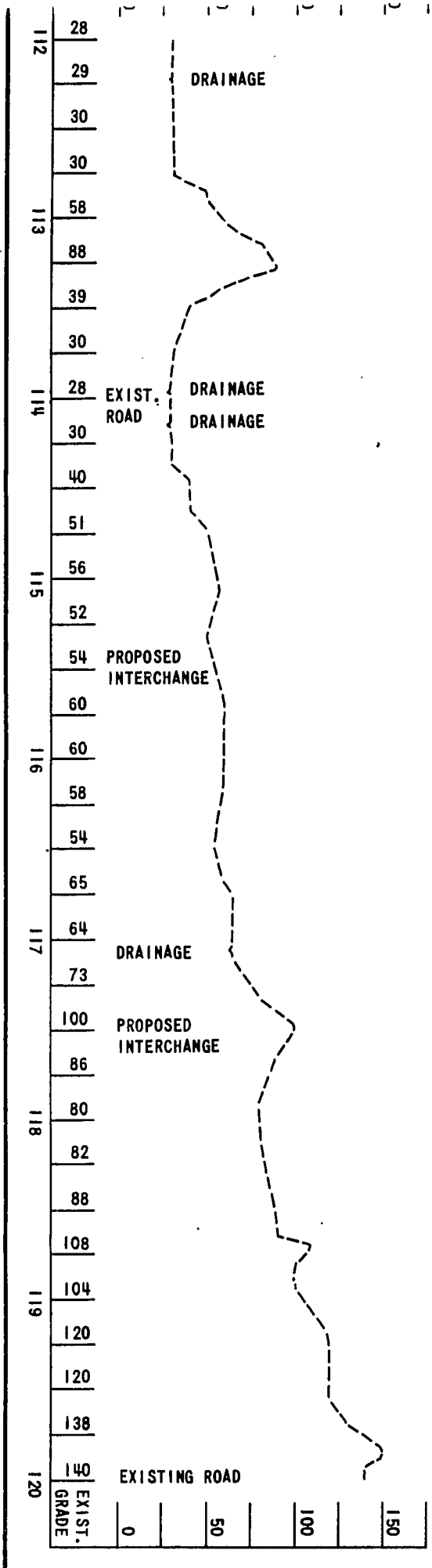

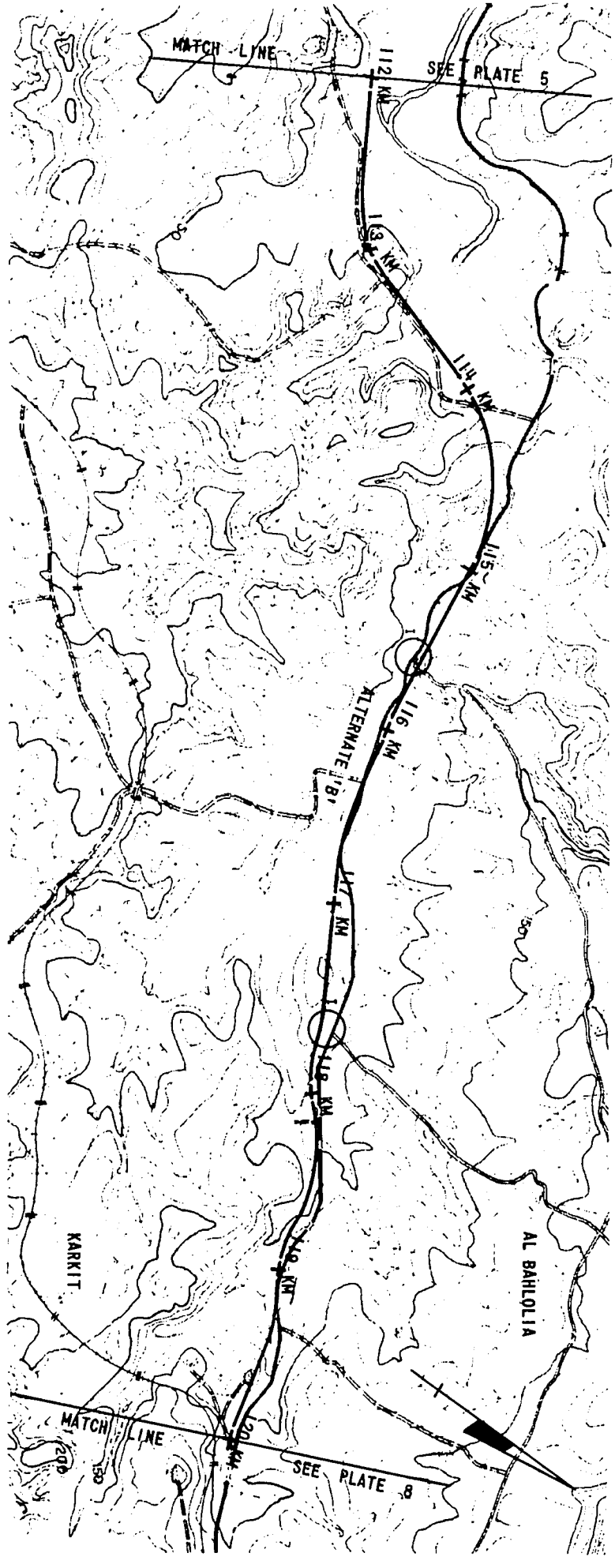

PLATE 7 KM 112 to KM 120 ALT. B LATTAKIA HIGHWAYS STUDY

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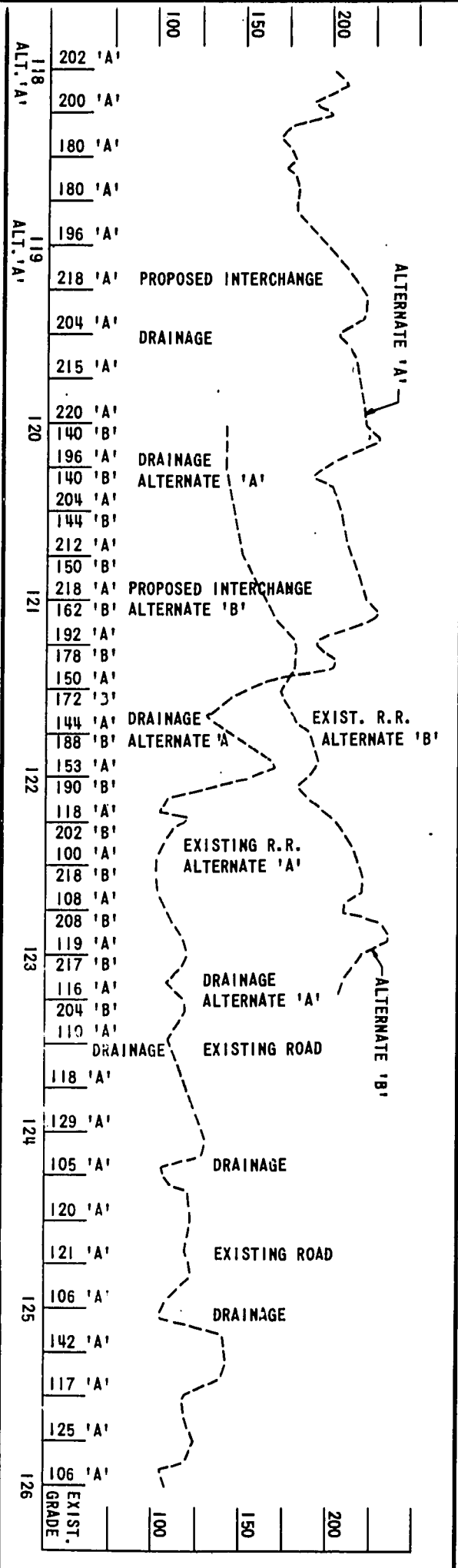

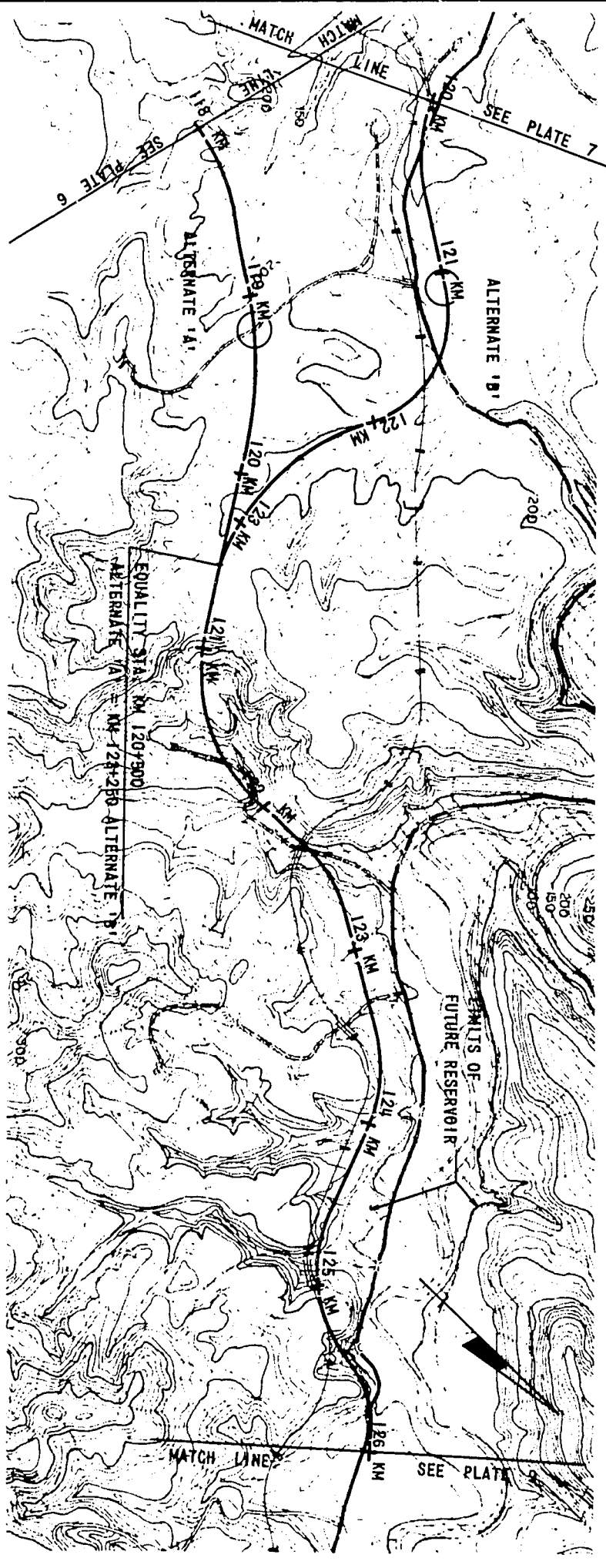

PLATE 8 KM 118/120 to KM 126 ALT. A / 123+250 ALT. B

LATTAKIA HIGHWAYS STUDY

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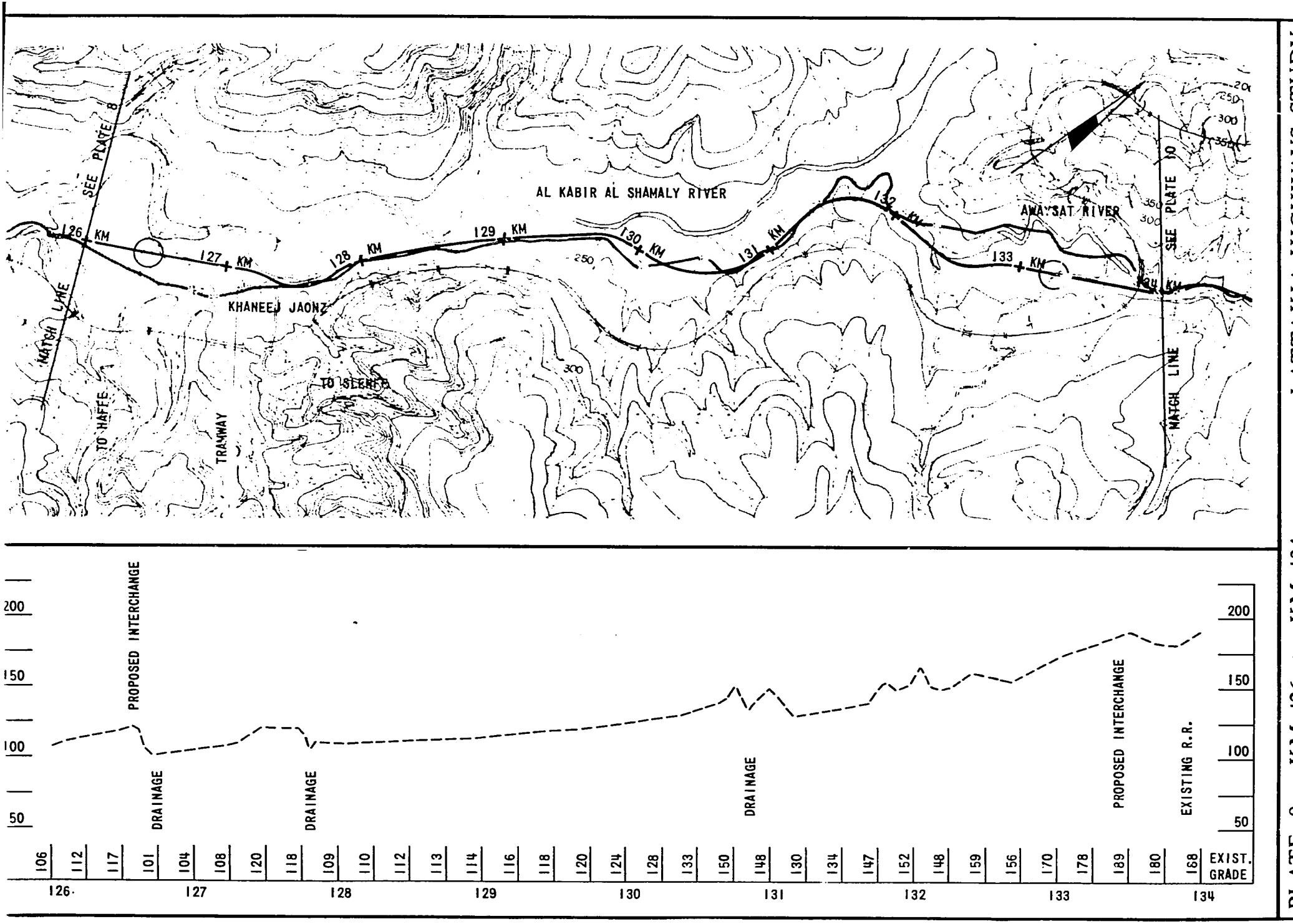
Syrian Arab Republic

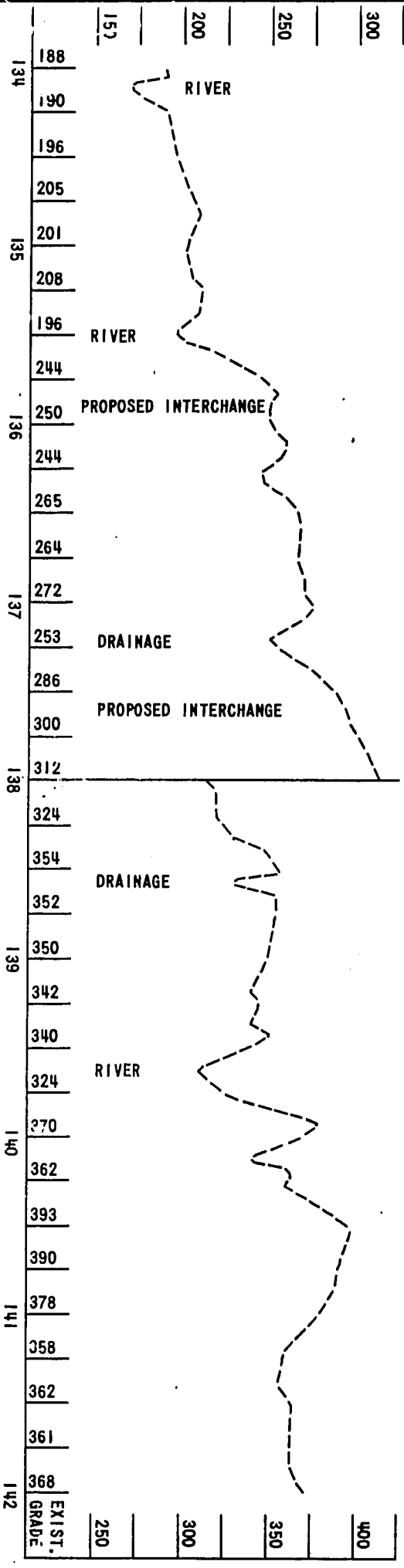


LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic

PLATE 9 KM 126 to KM 134

LYON associates, inc.



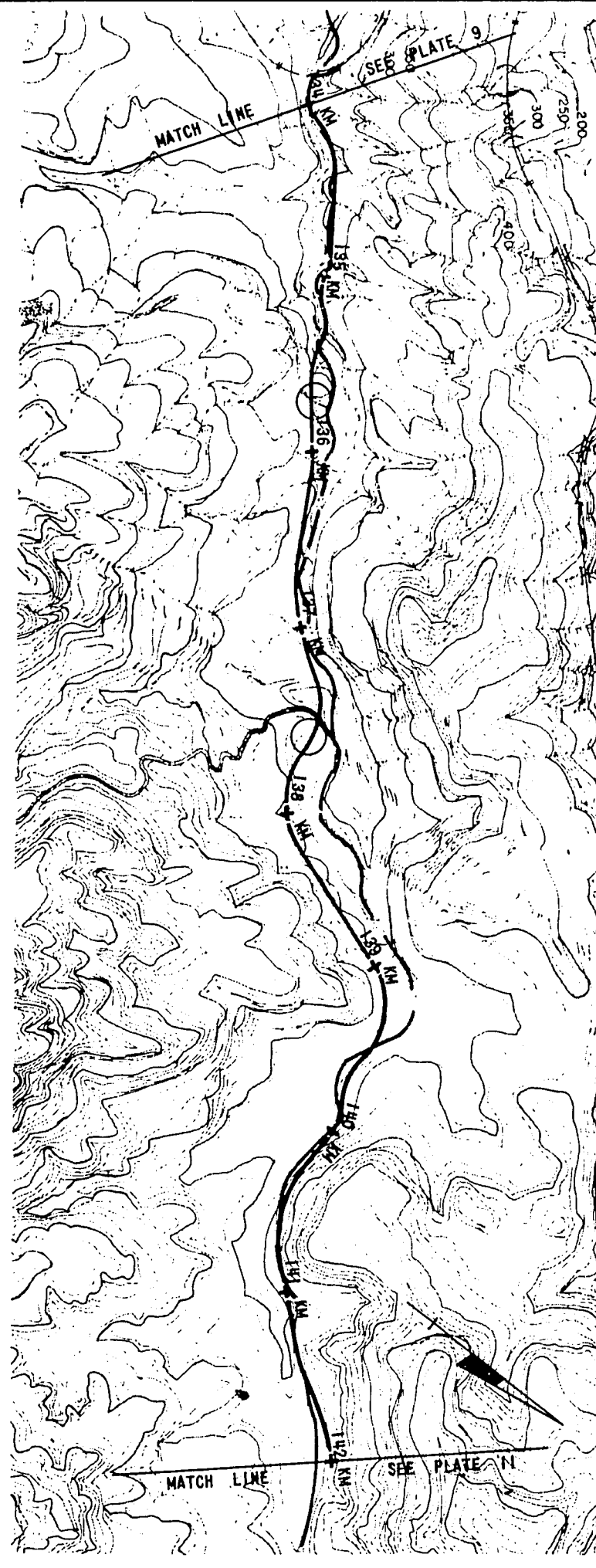


PLATE 10 KM 134 to KM 142

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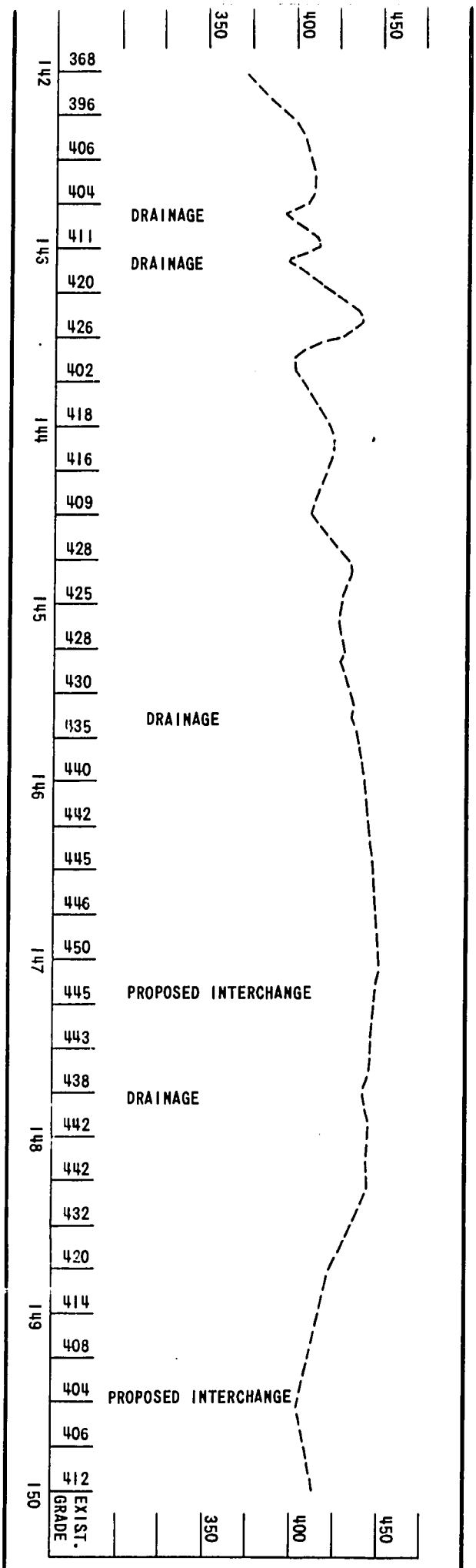
LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



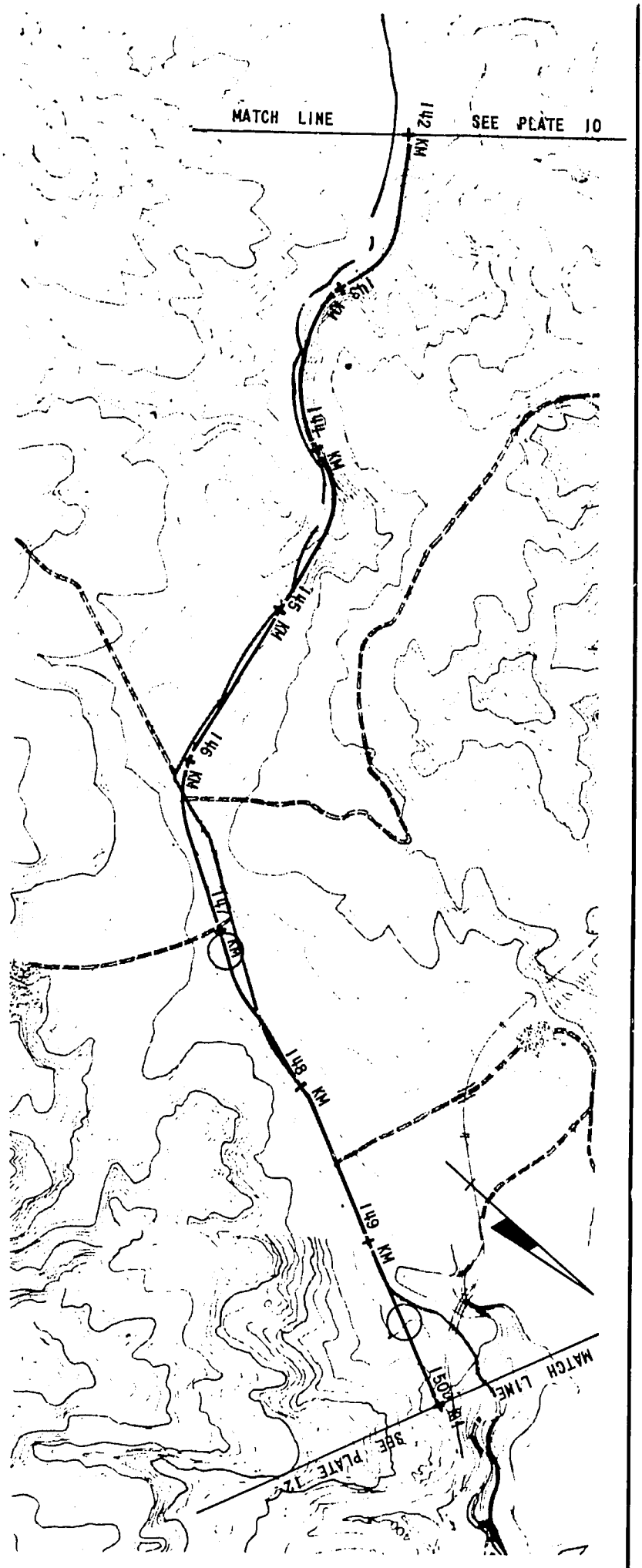
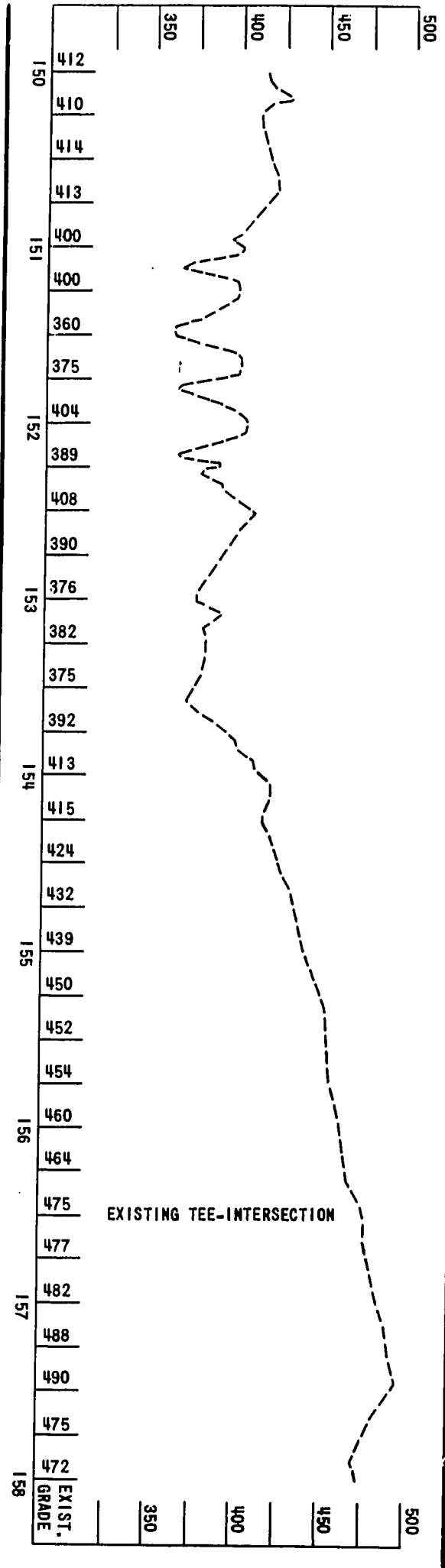


PLATE 11 KM 142 to KM 150

LYON associates, inc.

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



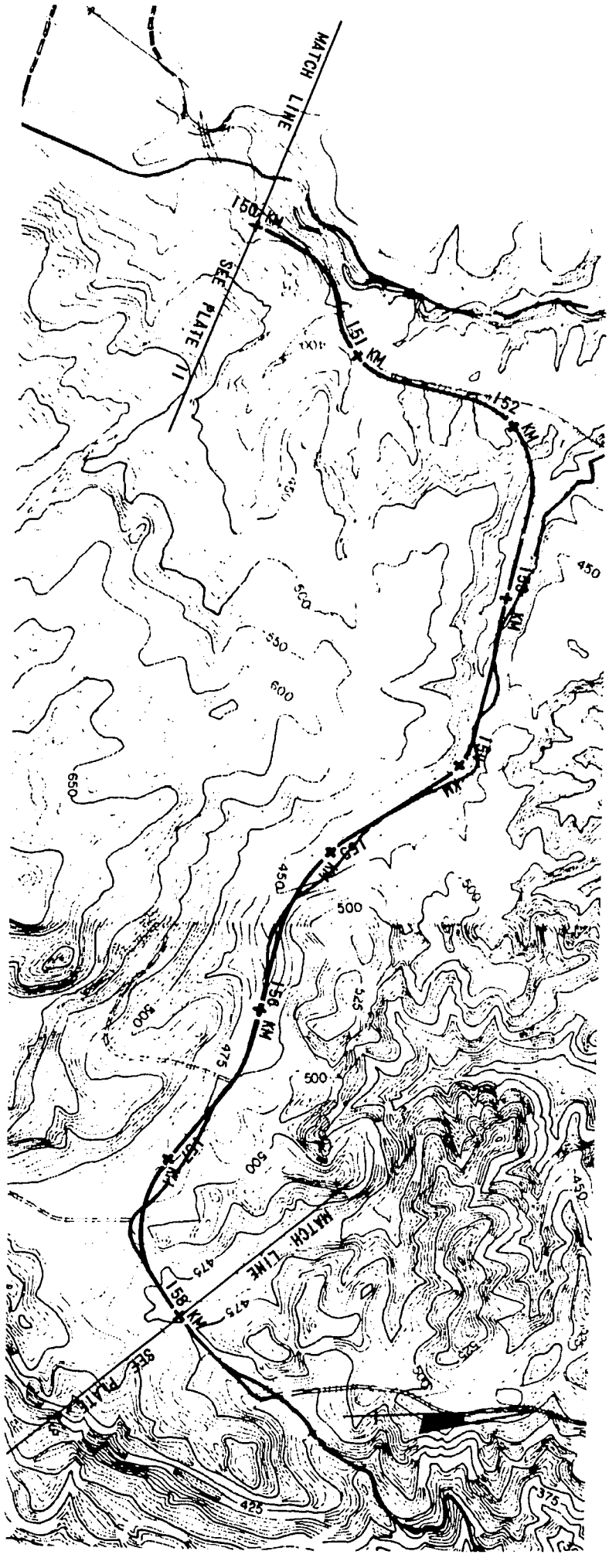
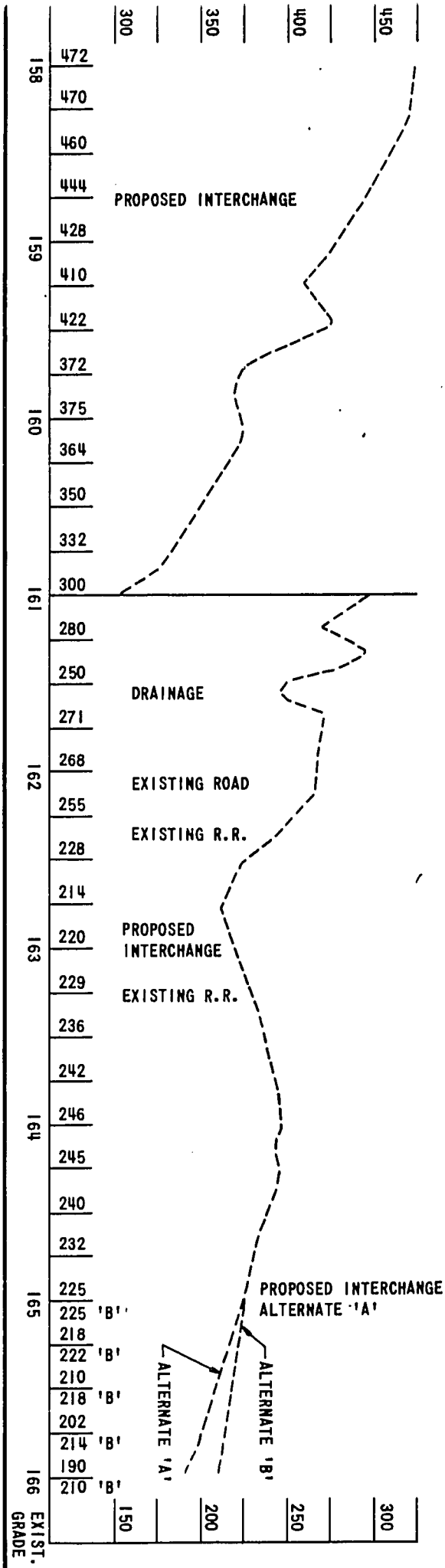


PLATE 12 KM 150 to KM 158

LYON associates, inc.

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



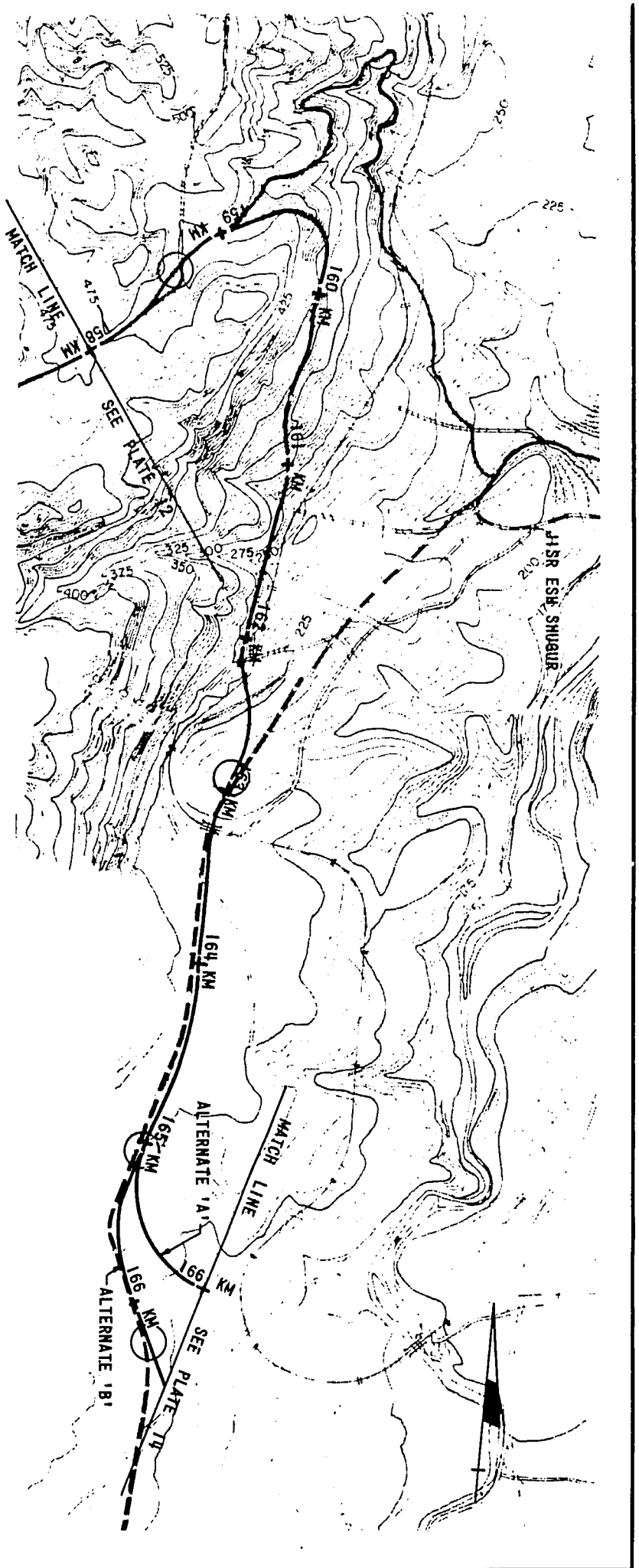
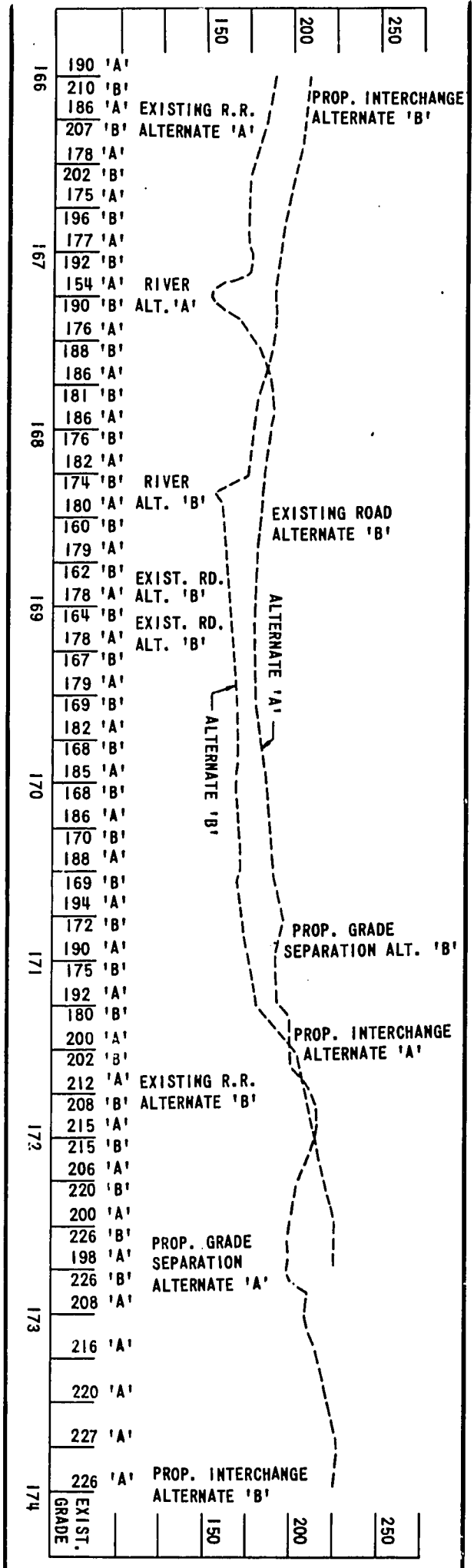


PLATE 13 KM 158/165 to KM 166 ALT. A / 166+500 ALT. B

LATTAKIA HIGHWAYS STUDY

LYON associates, inc.

Syrian Arab Republic



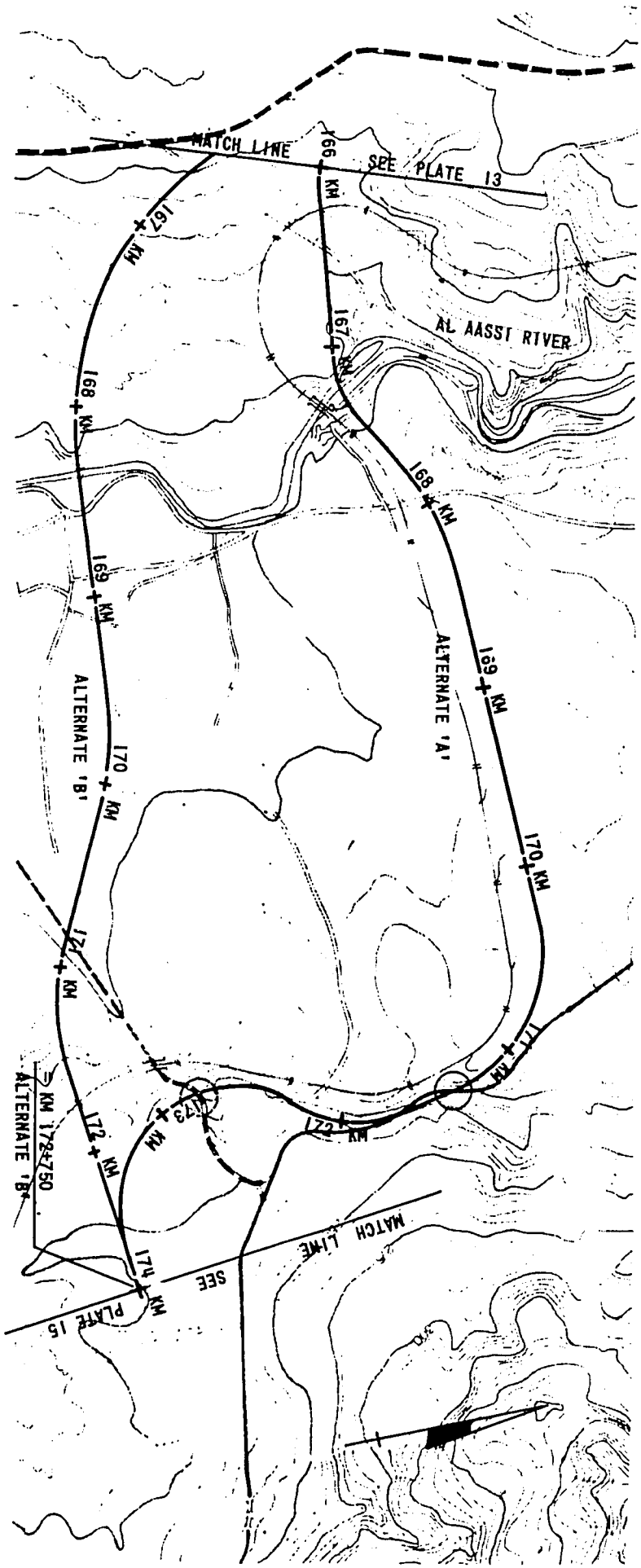
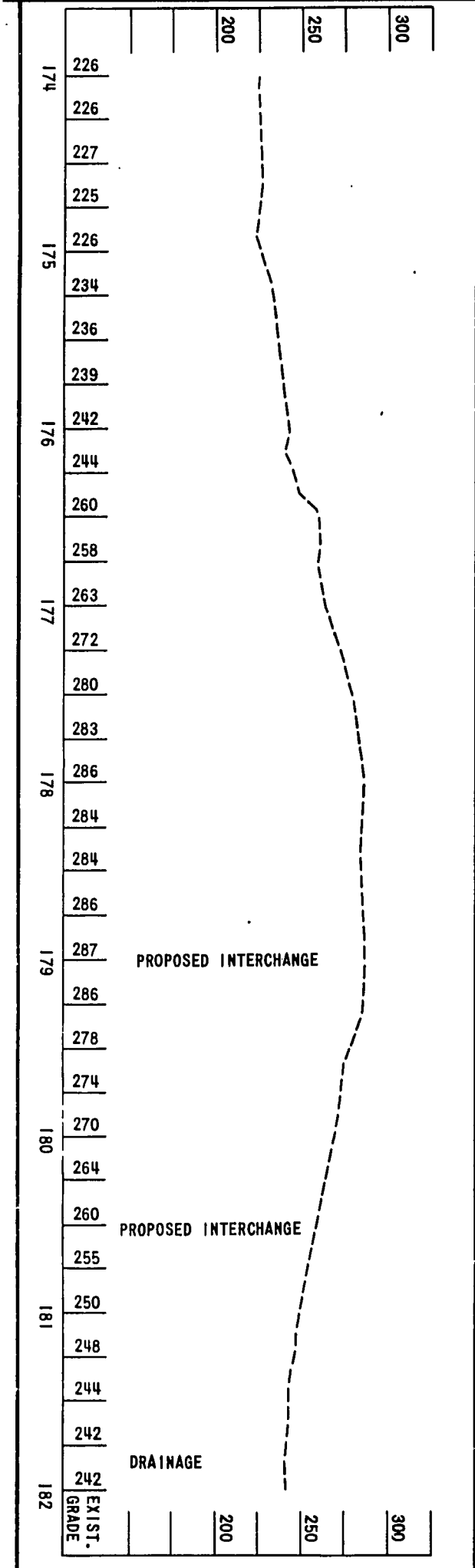


PLATE 14 KM 166 / 166+500 to KM 174 ALT. A / 172+750 ALT. B

LATTAKIA HIGHWAYS STUDY

LYON associates, inc.

Syrian Arab Republic



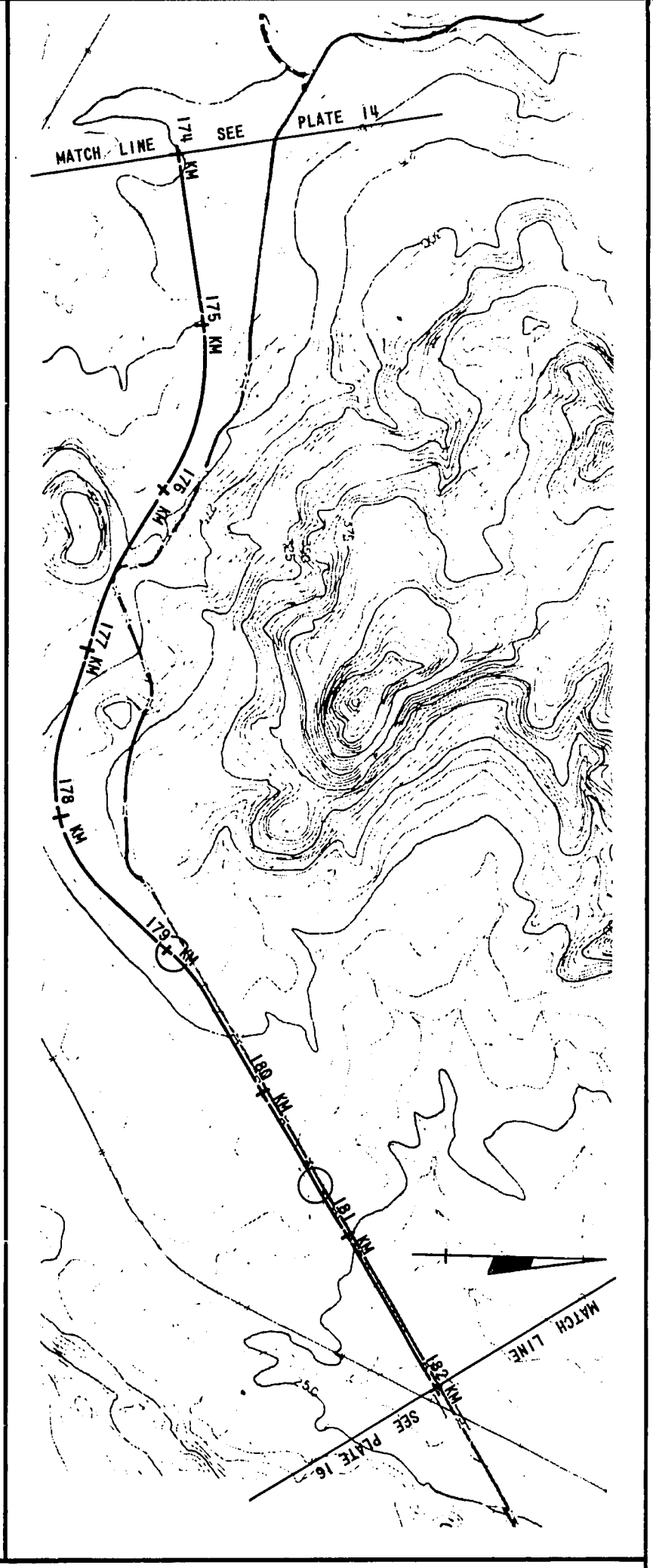
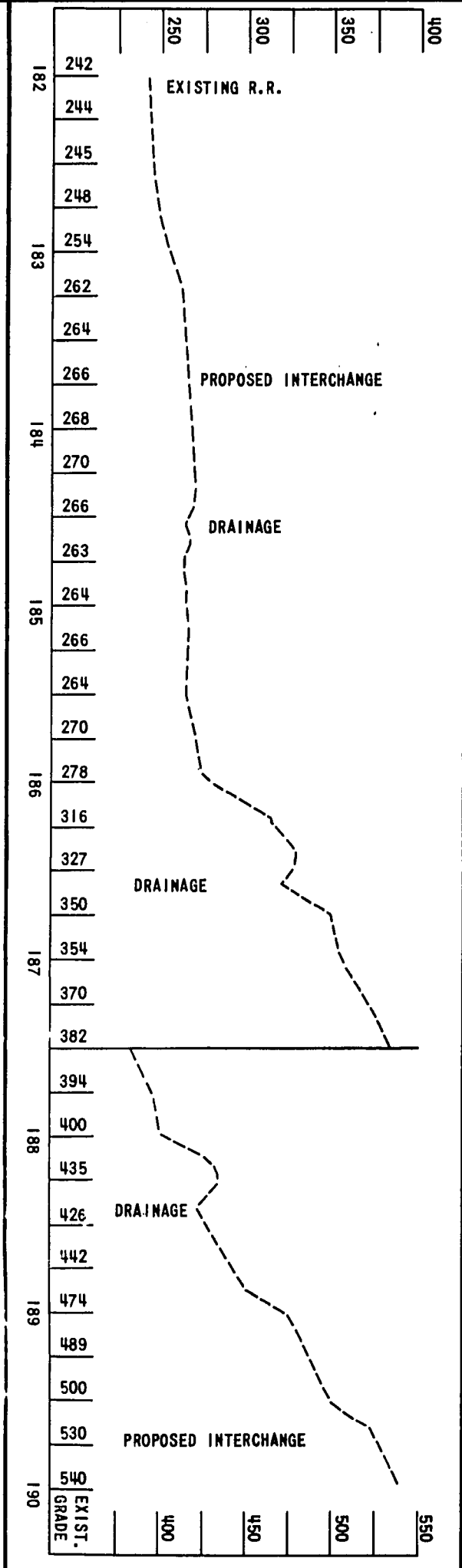


PLATE 15 KM 174 to KM 182

LYON associates, inc.

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



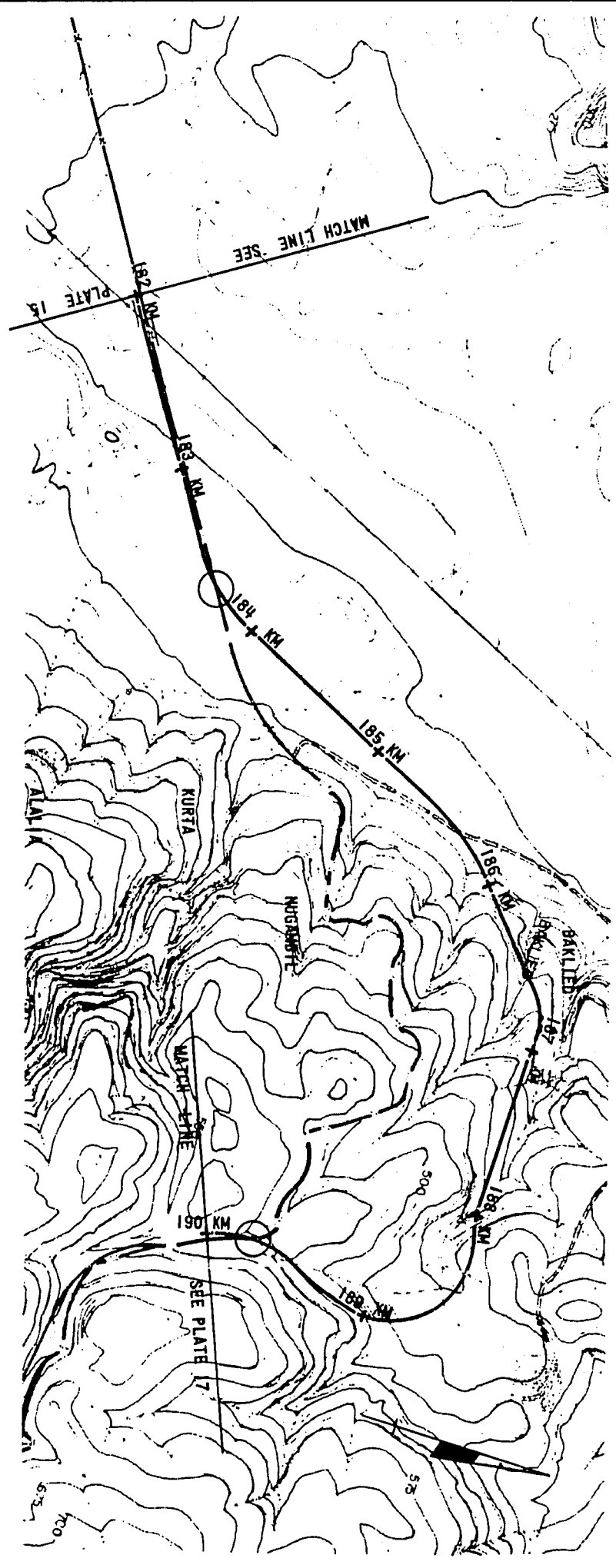
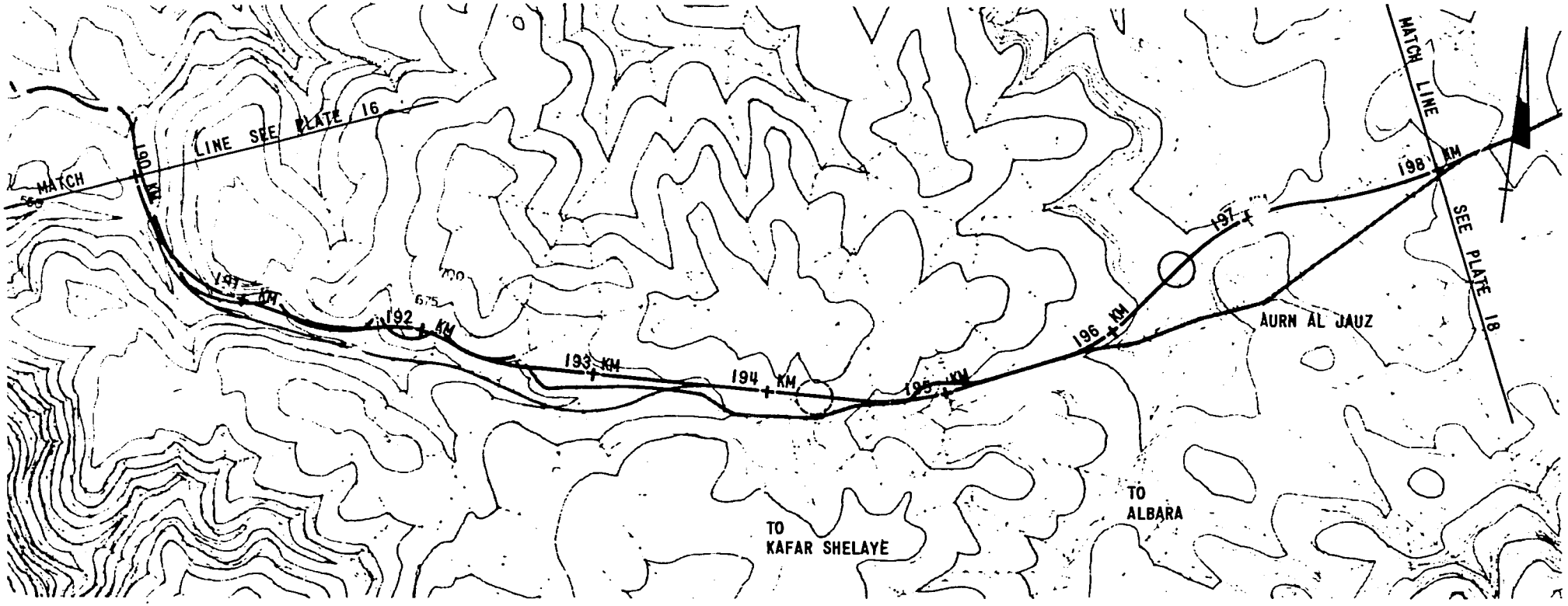


PLATE 16 KM 182 to KM 190

LYON associates, inc.

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



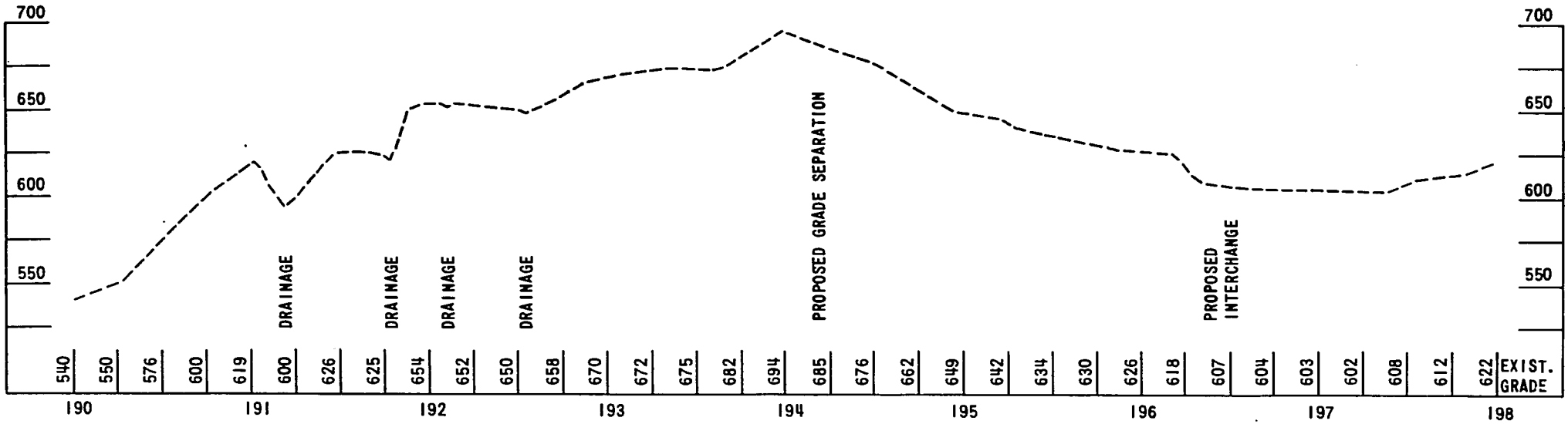
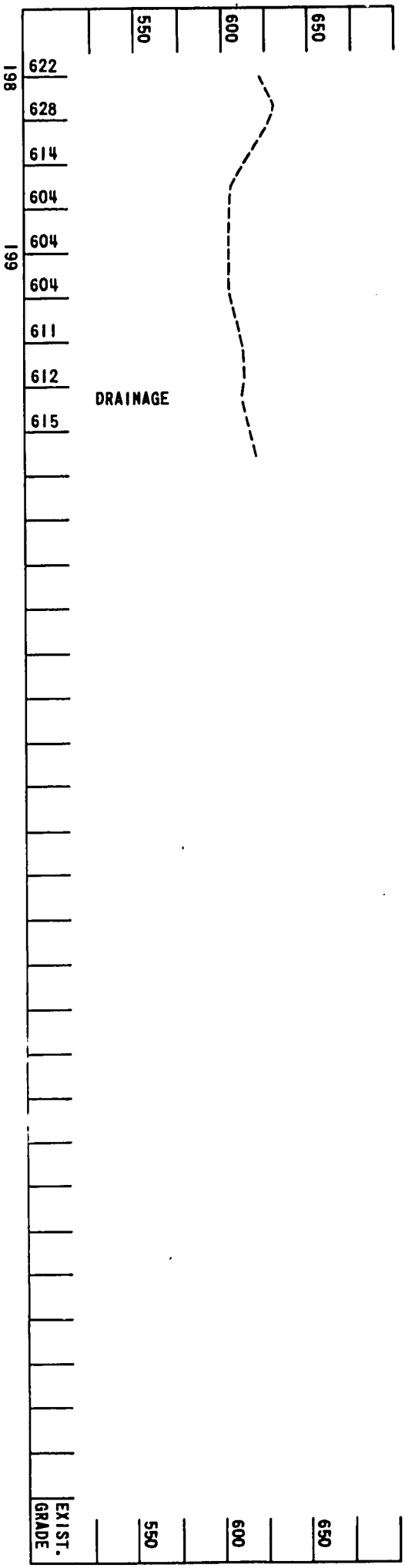


PLATE 17 KM 190 to KM 198

LYON associates, inc.

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic



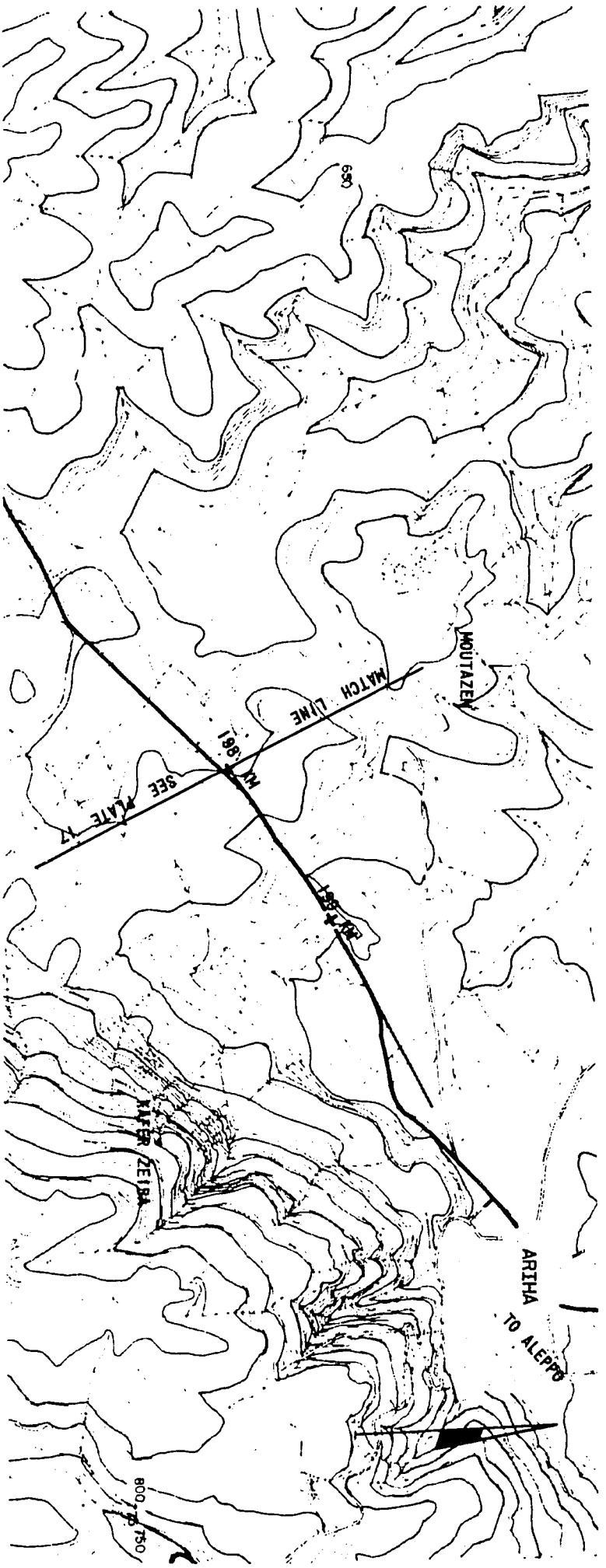


PLATE 18 KM 198 to END

LYON associates, inc.

LATTAKIA HIGHWAYS STUDY

Syrian Arab Republic

Appendix

TRAFFIC PROJECTIONS

TABLE 1
TRUCKS STUDIED BY TYPE AND WEIGHT
PORT OF LATTAKIA, FEBRUARY 1978
SINGLE UNIT VEHICLES

Weight Metric Tons	2 Axle Medium With Load	2 Axle Medium Without Load	2 Axle Large With Load	2 Axle Large Without Load	3 Axle With Load	3 Axle Without Load	Total With Load	Total Without Load
0 - 2.50								
2.51 - 4.50		15						15
4.51 - 6.50		51						51
6.51 - 8.50	3	34		5			3	39
8.51 - 10.50	8			43			8	43
10.51 - 12.50	11			2		5	11	7
12.51 - 14.50	24					6	24	6
14.51 - 16.50	8					1	8	1
16.51 - 18.50	35					-	35	-
18.51 - 20.50	17		2			1	19	1
20.51 - 22.50			7				7	
22.51 - 24.50			12				12	
24.51 - 26.50			9				9	
26.51 - 28.50			9				9	
28.51 - 30.50			3		1		4	
30.51 - 32.50					2		2	
32.51 - 34.50					2		2	
34.51 - 36.50					3		3	
36.51 - 38.50					-		-	
38.51 - 40.50					1		1	
40.51 - 42.50					-		-	
42.51 - 44.50					1		1	
Total	106	100	42	50	10	13	158	163

TABLE 2
TRUCKS STUDIED BY TYPE AND WEIGHT
PORT OF LATTAKIA, FEBRUARY 1978
COMBINATION VEHICLES

Weight Metric Tons	Truck plus Trailer		4 Axle Combination (Tractor + Semi Trailer		5 Axle Combination Tractor + Semi Trailer		Total	
	With Load	Without Load	With Load	Without Load	With Load	Without Load	With Load	Without Load
0 -10.50								
10.51 -12.50				2				2
12.51 -14.50		1		6				7
14.51 -16.50		6		7		1		14
16.51 -18.50		28		11		6		45
18.51 -20.50		6		13		3		22
20.51 -22.50						3		3
22.51 -24.50								
24.51 -26.50			1				1	
26.51 -28.50			-				-	
28.51 -30.50			1				1	
30.51 -32.50			-				-	
32.51 -34.50			-				-	
34.51 -36.50			2				2	
36.51 -38.50			-				-	
38.51 -40.50			-				-	
40.51 -42.50	3		3		1		7	
42.51 -44.50	1		4		-		5	
44.51 -46.50	1		7		2		10	
46.51 -48.50	-		6		4		10	
48.51 -50.50	2		5		2		9	
50.51 -52.50	3		3		2		8	
52.51 -54.50	2		19		5		26	
54.51 -56.50	5		11		1		17	
56.51 -58.50	5		16		1		22	
58.51 -60.50	8		5				13	
60.51 -62.50	1						1	
62.51 -64.50	1						1	
Total	32	41	83	39	18	13	133	93

TABLE 3
AXLE LOADINGS
SINGLE UNIT TRUCKS
PORT OF LATTAKIA, FEBRUARY 1978

Weight Metric Tons	2 Axle Medium		2 Axle Large		3 Axle			
	With Load	Without Load	With Load	Without Load	With Load		Without Load	
	Single Axle	Single Axle	Single Axle	Single Axle	Single Axle	Tandem Axle	Single Axle	Tandem Axle
0 - 1.50	-	5						
1.51 - 2.50	3	38						
2.51 - 3.50	13	117						
3.51 - 4.50	32	40		43			5	
4.51 - 5.50	42			36			6	
5.51 - 6.50	23		6	21			1	
6.51 - 7.50	5		17		1		1	3
7.51 - 8.50	7		16		6			6
8.51 - 9.50	22		3		1			2
9.51 - 10.50	7				2			1
10.51 - 11.50	4							-
11.51 - 12.50	29							1
12.51 - 13.50	23							
13.51 - 14.50	2		2					
14.51 - 15.50			6					
15.51 - 16.50			6					
16.51 - 17.50			9					
17.51 - 18.50			6					
18.51 - 19.50			7					
19.51 - 20.50			5					
20.51 - 21.50			1					
21.51 - 22.50						1		
22.51 - 23.50						-		
23.51 - 24.50						2		
24.51 - 25.50						-		
25.51 - 26.50						3		
26.51 - 27.50						2		
27.51 - 28.50						-		
28.51 - 29.50						-		
29.51 - 30.50						1		
31.51 - 31.50						-		
32.51 - 33.50						1		
33.51 - 34.50						-		
Total	212	200	84	100	10	10	13	13

TABLE 4
AXLE LOADINGS
COMBINATION VEHICLES
PORT OF LATTAKIA, FEBRUARY 1978

Metric Tons	Truck & Trailer With Load Single Axle	Truck & Trailer Without Load Single Axle	Tractor & Semi-Trailer (4 Axles) With Load Single Axle	Tractor & Semi-Trailer (4 Axles) With Load Tandem Axle	Tractor & Semi-Trailer (4 Axles) Without load Single Axle	Tractor & Semi-Trailer (4 Axles) Without load Tandem Axle	Tractor & Semi-Trailer (5 Axles) With Load Single Axle	Tractor & Semi-Trailer (5 Axles) With Load Tandem Axle	Tractor & Semi-Trailer (5 Axles) Without load Single Axle	Tractor & Semi-Trailer (5 Axles) Without load Tandem Axle
0 - 1.50										
1.51 - 2.50		2								
2.51 - 3.50		74	1		8				1	
3.51 - 4.50		8	1		29				12	
4.51 - 5.50		41	5		20		9			
5.51 - 6.50	4	31	22		21	8	9			2
6.51 - 7.50	4	8	45			7				9
7.51 - 8.50	17		10			14				12
8.51 - 9.50	7		1			10				3
9.51 - 10.50	-		-							
10.51 - 11.50	10		2							
11.51 - 12.50	2		-							
12.51 - 13.50	12		6							
13.51 - 14.50	15		10							
14.51 - 15.50	11		9	1				1		
15.51 - 16.50	17		8	-				1		
16.51 - 17.50	5		25	1				5		
17.51 - 18.50	7		17	-				3		
18.51 - 19.50	7		4	-				5		
19.51 - 20.50	7			2				3		
20.51 - 21.50	3			-				-		
21.51 - 22.50				-				1		
22.51 - 23.50				3				-		
23.51 - 24.50				3				2		
24.51 - 25.50				5				4		
25.51 - 26.50				5				2		
26.51 - 27.50				4				1		
27.51 - 28.50				6				4		
28.51 - 29.50				3				2		
29.51 - 30.50				18				2		
30.51 - 31.50				10						
31.51 - 32.50				16						
32.51 - 33.50				2						
33.51 - 34.50				4						
Total	128	164	166	83	78	39	18	36	13	26

TABLE 5
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	174.	127.	111.	323.	49.	784.	38.	55.	6.
1979	192.	139.	121.	352.	53.	857.	39.	55.	6.
1980	212.	152.	132.	384.	58.	938.	39.	55.	6.
1981	234.	166.	144.	419.	63.	1026.	39.	55.	6.
1982	259.	181.	157.	457.	69.	1123.	39.	55.	6.
1983	286.	197.	171.	499.	75.	1228.	39.	55.	6.
1984	311.	211.	185.	533.	80.	1320.	40.	54.	6.
1985	338.	226.	200.	570.	86.	1420.	40.	54.	6.
1986	367.	242.	216.	609.	92.	1526.	40.	54.	6.
1987	399.	259.	233.	651.	98.	1640.	40.	54.	6.
1988	434.	277.	252.	696.	105.	1764.	40.	54.	6.
1989	472.	296.	272.	744.	112.	1896.	41.	54.	6.
1990	513.	316.	294.	795.	120.	2038.	41.	53.	6.
1991	558.	338.	318.	850.	128.	2192.	41.	53.	6.
1992	607.	361.	344.	909.	137.	2358.	41.	53.	6.
1993	660.	386.	372.	972.	146.	2536.	41.	53.	6.
1994	701.	407.	395.	1025.	154.	2682.	41.	53.	6.
1995	744.	429.	419.	1081.	162.	2835.	41.	53.	6.
1996	790.	453.	445.	1140.	171.	2999.	41.	53.	6.
1997	839.	478.	472.	1203.	180.	3172.	42.	53.	6.
1998	891.	504.	501.	1269.	190.	3355.	42.	53.	6.
1999	946.	532.	532.	1339.	200.	3549.	42.	53.	6.
2000	1005.	561.	564.	1413.	211.	3754.	42.	53.	6.
2001	1067.	592.	598.	1491.	223.	3971.	42.	53.	6.
2002	1133.	625.	634.	1573.	235.	4200.	42.	53.	6.
2003	1203.	659.	673.	1660.	248.	4443.	42.	53.	6.

TABLE 6
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	170.	122.	95.	311.	52.	750.	39.	54.	7.
1979	188.	133.	104.	339.	57.	821.	39.	54.	7.
1980	208.	145.	114.	370.	62.	899.	39.	54.	7.
1981	230.	158.	124.	404.	68.	984.	39.	54.	7.
1982	254.	172.	135.	441.	74.	1076.	40.	54.	7.
1983	281.	188.	147.	481.	81.	1178.	40.	53.	7.
1984	305.	201.	159.	514.	87.	1266.	40.	53.	7.
1985	332.	215.	172.	549.	93.	1361.	40.	53.	7.
1986	361.	230.	186.	587.	99.	1463.	40.	53.	7.
1987	392.	246.	201.	628.	106.	1573.	41.	53.	7.
1988	426.	263.	217.	671.	113.	1690.	41.	53.	7.
1989	463.	281.	235.	717.	121.	1817.	41.	52.	7.
1990	503.	300.	254.	766.	129.	1952.	41.	52.	7.
1991	547.	321.	275.	819.	138.	2100.	41.	52.	7.
1992	595.	343.	297.	876.	148.	2259.	42.	52.	7.
1993	647.	367.	321.	936.	158.	2429.	42.	52.	7.
1994	687.	387.	341.	987.	167.	2569.	42.	52.	7.
1995	730.	408.	362.	1041.	176.	2717.	42.	52.	6.
1996	775.	430.	384.	1098.	186.	2873.	42.	52.	6.
1997	823.	454.	407.	1158.	196.	3038.	42.	52.	6.
1998	874.	479.	432.	1222.	207.	3214.	42.	51.	6.
1999	928.	505.	458.	1289.	218.	3398.	42.	51.	6.
2000	986.	533.	486.	1360.	230.	3595.	42.	51.	6.
2001	1047.	562.	516.	1435.	243.	3803.	42.	51.	6.
2002	1112.	593.	547.	1514.	256.	4022.	42.	51.	6.
2003	1181.	626.	580.	1597.	270.	4254.	42.	51.	6.

TABLE 7
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	344.	249.	206.	634.	101.	1534.	39.	55.	7.
1979	380.	272.	225.	692.	110.	1679.	39.	55.	7.
1980	420.	297.	246.	755.	120.	1838.	39.	54.	7.
1981	464.	324.	269.	824.	131.	2012.	39.	54.	7.
1982	513.	353.	294.	899.	143.	2202.	39.	54.	6.
1983	567.	385.	321.	981.	156.	2410.	40.	54.	6.
1984	616.	412.	347.	1049.	167.	2591.	40.	54.	6.
1985	670.	440.	375.	1121.	179.	2785.	40.	54.	6.
1986	728.	470.	405.	1198.	191.	2992.	40.	54.	6.
1987	791.	502.	438.	1281.	204.	3216.	40.	53.	6.
1988	860.	537.	473.	1369.	218.	3457.	40.	53.	6.
1989	935.	574.	511.	1463.	233.	3716.	41.	53.	6.
1990	1016.	614.	552.	1564.	249.	3995.	41.	53.	6.
1991	1104.	656.	597.	1672.	266.	4295.	41.	53.	6.
1992	1200.	701.	645.	1787.	284.	4617.	41.	53.	6.
1993	1304.	749.	697.	1910.	304.	4964.	41.	53.	6.
1994	1385.	790.	740.	2015.	321.	5251.	41.	52.	6.
1995	1471.	833.	785.	2126.	339.	5554.	41.	52.	6.
1996	1562.	879.	833.	2243.	358.	5875.	42.	52.	6.
1997	1659.	927.	884.	2366.	378.	6214.	42.	52.	6.
1998	1762.	978.	938.	2496.	399.	6573.	42.	52.	6.
1999	1871.	1032.	995.	2633.	421.	6952.	42.	52.	6.
2000	1987.	1089.	1056.	2778.	444.	7354.	42.	52.	6.
2001	2110.	1149.	1120.	2931.	468.	7778.	42.	52.	6.
2002	2241.	1212.	1188.	3092.	494.	8227.	42.	52.	6.
2003	2380.	1279.	1260.	3262.	521.	8702.	42.	52.	6.

TABLE 8
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	155.	86.	50.	304.	52.	647.	37.	55.	8.
1979	171.	94.	55.	332.	57.	709.	37.	55.	8.
1980	189.	103.	60.	362.	62.	776.	38.	54.	8.
1981	209.	112.	66.	395.	68.	850.	38.	54.	8.
1982	231.	122.	72.	431.	74.	930.	38.	54.	8.
1983	255.	133.	79.	470.	81.	1018.	38.	54.	8.
1984	277.	142.	85.	502.	87.	1093.	38.	54.	8.
1985	301.	152.	92.	537.	93.	1175.	39.	54.	8.
1986	327.	162.	99.	574.	99.	1261.	39.	53.	8.
1987	355.	173.	107.	614.	106.	1355.	39.	53.	8.
1988	386.	185.	116.	656.	113.	1456.	39.	53.	8.
1989	420.	198.	125.	701.	121.	1565.	39.	53.	8.
1990	457.	212.	135.	749.	129.	1682.	40.	53.	8.
1991	497.	227.	146.	801.	138.	1809.	40.	52.	8.
1992	540.	243.	158.	856.	148.	1945.	40.	52.	8.
1993	587.	260.	171.	915.	158.	2091.	41.	52.	8.
1994	623.	274.	181.	965.	167.	2210.	41.	52.	8.
1995	662.	289.	192.	1018.	176.	2337.	41.	52.	8.
1996	703.	305.	204.	1074.	186.	2472.	41.	52.	8.
1997	747.	322.	216.	1133.	196.	2614.	41.	52.	7.
1998	793.	340.	229.	1195.	207.	2764.	41.	52.	7.
1999	842.	359.	243.	1261.	218.	2923.	41.	51.	7.
2000	894.	379.	258.	1330.	230.	3091.	41.	51.	7.
2001	949.	400.	274.	1403.	243.	3269.	41.	51.	7.
2002	1008.	422.	291.	1480.	256.	3457.	41.	51.	7.
2003	1070.	445.	309.	1561.	270.	3655.	41.	51.	7.

TABLE 9
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	143.	96.	46.	277.	52.	614.	39.	53.	8.
1979	158.	105.	50.	302.	57.	672.	39.	52.	8.
1980	175.	115.	55.	329.	62.	736.	39.	52.	8.
1981	193.	125.	60.	359.	68.	805.	40.	52.	8.
1982	213.	136.	66.	392.	74.	881.	40.	52.	8.
1983	235.	148.	72.	428.	81.	964.	40.	52.	8.
1984	255.	158.	78.	458.	87.	1036.	40.	52.	8.
1985	277.	169.	84.	490.	93.	1113.	40.	52.	8.
1986	301.	181.	91.	524.	99.	1196.	40.	51.	8.
1987	327.	193.	98.	560.	106.	1284.	40.	51.	8.
1988	355.	206.	106.	599.	113.	1379.	41.	51.	8.
1989	386.	220.	115.	640.	121.	1482.	41.	51.	8.
1990	420.	235.	124.	684.	129.	1592.	41.	51.	8.
1991	457.	251.	134.	731.	138.	1711.	41.	51.	8.
1992	497.	268.	145.	781.	148.	1839.	42.	50.	8.
1993	540.	286.	157.	835.	158.	1976.	42.	50.	8.
1994	573.	302.	167.	881.	167.	2090.	42.	50.	8.
1995	609.	319.	177.	929.	176.	2210.	42.	50.	8.
1996	647.	337.	188.	980.	186.	2338.	42.	50.	8.
1997	687.	356.	199.	1034.	196.	2472.	42.	50.	8.
1998	730.	376.	211.	1091.	207.	2615.	42.	50.	8.
1999	775.	397.	224.	1151.	218.	2765.	42.	50.	8.
2000	823.	419.	238.	1214.	230.	2924.	42.	50.	8.
2001	874.	442.	253.	1281.	243.	3093.	43.	50.	8.
2002	928.	466.	268.	1351.	256.	3269.	43.	50.	8.
2003	986.	492.	284.	1425.	270.	3457.	43.	49.	8.

TABLE 10
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR - TWO DIRECTIONS

	GROWTH RATES 1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	298.	182.	96.	581.	104.	1261.	38.	54.	8.
1979	329.	199.	105.	634.	113.	1380.	38.	54.	8.
1980	364.	217.	115.	692.	123.	1511.	38.	53.	8.
1981	402.	237.	126.	755.	134.	1654.	39.	53.	8.
1982	444.	259.	138.	824.	146.	1811.	39.	53.	8.
1983	491.	283.	151.	899.	159.	1983.	39.	53.	8.
1984	534.	303.	163.	961.	170.	2131.	39.	53.	8.
1985	580.	324.	176.	1027.	182.	2289.	39.	53.	8.
1986	630.	346.	190.	1098.	195.	2459.	40.	52.	8.
1987	685.	370.	205.	1174.	208.	2642.	40.	52.	8.
1988	745.	396.	222.	1255.	222.	2840.	40.	52.	8.
1989	810.	423.	240.	1342.	237.	3052.	40.	52.	8.
1990	880.	452.	259.	1435.	253.	3279.	41.	52.	8.
1991	957.	483.	280.	1534.	270.	3524.	41.	51.	8.
1992	1040.	516.	303.	1640.	289.	3788.	41.	51.	8.
1993	1130.	552.	328.	1753.	309.	4072.	41.	51.	8.
1994	1200.	582.	348.	1849.	326.	4305.	41.	51.	8.
1995	1274.	614.	369.	1951.	344.	4552.	41.	51.	8.
1996	1353.	648.	392.	2058.	363.	4814.	42.	51.	8.
1997	1437.	684.	416.	2171.	383.	5091.	42.	51.	8.
1998	1526.	722.	441.	2290.	404.	5383.	42.	51.	8.
1999	1621.	762.	468.	2416.	426.	5693.	42.	51.	7.
2000	1722.	804.	497.	2549.	449.	6021.	42.	51.	7.
2001	1829.	848.	527.	2689.	474.	6367.	42.	51.	7.
2002	1942.	895.	559.	2837.	500.	6733.	42.	50.	7.
2003	2062.	944.	593.	2993.	528.	7120.	42.	50.	7.

TABLE 11
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
JISR ESH SHUGUR BYPASS - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	128.	53.	11.	272.	48.	512.	35.	55.	9.
1979	141.	58.	12.	297.	52.	560.	36.	55.	9.
1980	156.	63.	13.	324.	57.	613.	36.	55.	9.
1981	172.	69.	14.	353.	62.	670.	36.	55.	9.
1982	190.	75.	15.	385.	68.	733.	36.	55.	9.
1983	210.	82.	16.	420.	74.	802.	36.	54.	9.
1984	228.	88.	17.	449.	79.	861.	37.	54.	9.
1985	248.	94.	18.	480.	84.	924.	37.	54.	9.
1986	270.	100.	19.	513.	90.	992.	37.	54.	9.
1987	293.	107.	21.	548.	96.	1065.	38.	53.	9.
1988	318.	114.	23.	586.	103.	1144.	38.	53.	9.
1989	346.	122.	25.	626.	110.	1229.	38.	53.	9.
1990	376.	130.	27.	669.	118.	1320.	38.	53.	9.
1991	409.	139.	29.	715.	126.	1418.	39.	52.	9.
1992	445.	149.	31.	764.	135.	1524.	39.	52.	9.
1993	484.	159.	34.	817.	144.	1638.	39.	52.	9.
1994	514.	168.	36.	862.	152.	1732.	39.	52.	9.
1995	546.	177.	38.	909.	160.	1830.	40.	52.	9.
1996	580.	187.	40.	959.	169.	1935.	40.	52.	9.
1997	616.	197.	42.	1012.	178.	2045.	40.	52.	9.
1998	654.	208.	45.	1068.	188.	2163.	40.	51.	9.
1999	695.	219.	48.	1127.	198.	2287.	40.	51.	9.
2000	738.	231.	51.	1189.	209.	2418.	40.	51.	9.
2001	784.	244.	54.	1254.	220.	2556.	40.	51.	9.
2002	833.	257.	57.	1323.	232.	2702.	40.	51.	9.
2003	885.	271.	60.	1396.	245.	2857.	40.	51.	9.

TABLE 12
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
JISR ESH SHUGUR BYPASS - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	126.	67.	16.	227.	47.	483.	40.	50.	10.
1979	139.	73.	17.	248.	51.	528.	40.	50.	10.
1980	154.	80.	19.	271.	56.	580.	40.	50.	10.
1981	170.	87.	21.	296.	61.	635.	40.	50.	10.
1982	188.	95.	23.	323.	67.	696.	41.	50.	10.
1983	208.	104.	25.	352.	73.	762.	41.	49.	10.
1984	226.	111.	27.	376.	78.	818.	41.	49.	10.
1985	246.	119.	29.	402.	83.	879.	42.	49.	9.
1986	267.	127.	31.	430.	89.	944.	42.	49.	9.
1987	290.	136.	34.	460.	95.	1015.	42.	49.	9.
1988	315.	145.	37.	492.	102.	1091.	42.	48.	9.
1989	342.	155.	40.	526.	109.	1172.	42.	48.	9.
1990	372.	166.	43.	562.	117.	1260.	43.	48.	9.
1991	404.	177.	46.	601.	125.	1353.	43.	48.	9.
1992	439.	189.	50.	642.	134.	1454.	43.	45.	9.
1993	477.	202.	54.	686.	143.	1562.	43.	47.	9.
1994	507.	213.	57.	724.	151.	1652.	44.	47.	9.
1995	538.	225.	60.	764.	159.	1746.	44.	47.	9.
1996	571.	237.	64.	806.	168.	1846.	44.	47.	9.
1997	606.	250.	68.	850.	177.	1951.	44.	47.	9.
1998	644.	264.	72.	897.	187.	2064.	44.	47.	9.
1999	684.	279.	76.	946.	197.	2182.	44.	47.	9.
2000	726.	294.	81.	998.	208.	2307.	44.	47.	9.
2001	771.	310.	86.	1053.	219.	2439.	44.	47.	9.
2002	819.	327.	91.	1111.	231.	2579.	44.	47.	9.
2003	870.	345.	97.	1172.	244.	2726.	45.	47.	9.

TABLE 13
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
JISR ESH SHUGUR BYPASS - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	254.	120.	27.	499.	95.	995.	38.	53.	10.
1979	261.	131.	29.	544.	104.	1089.	38.	53.	10.
1980	311.	143.	32.	594.	113.	1193.	38.	52.	9.
1981	344.	156.	35.	648.	123.	1306.	38.	52.	9.
1982	380.	170.	38.	707.	134.	1429.	38.	52.	9.
1983	420.	185.	41.	771.	146.	1563.	39.	52.	9.
1984	457.	198.	44.	824.	156.	1679.	39.	52.	9.
1985	497.	212.	48.	881.	167.	1805.	39.	51.	9.
1986	540.	227.	52.	942.	179.	1940.	40.	51.	9.
1987	587.	243.	56.	1007.	191.	2084.	40.	51.	9.
1988	638.	260.	61.	1076.	204.	2239.	40.	51.	9.
1989	694.	278.	66.	1150.	218.	2406.	40.	51.	9.
1990	754.	297.	71.	1229.	233.	2584.	41.	50.	9.
1991	820.	317.	77.	1314.	249.	2777.	41.	50.	9.
1992	891.	339.	83.	1405.	266.	2984.	41.	50.	9.
1993	969.	362.	90.	1502.	284.	3207.	42.	50.	9.
1994	1029.	382.	95.	1585.	300.	3391.	42.	50.	9.
1995	1093.	403.	101.	1672.	317.	3586.	42.	49.	9.
1996	1161.	425.	107.	1764.	334.	3791.	42.	49.	9.
1997	1233.	448.	114.	1861.	352.	4008.	42.	49.	9.
1998	1309.	473.	121.	1963.	371.	4237.	42.	49.	9.
1999	1390.	499.	128.	2071.	391.	4479.	42.	49.	9.
2000	1476.	526.	136.	2185.	413.	4736.	42.	49.	9.
2001	1568.	555.	144.	2305.	436.	5008.	42.	49.	9.
2002	1665.	586.	153.	2432.	460.	5296.	43.	49.	9.
2003	1768.	618.	162.	2566.	485.	5599.	43.	49.	9.

TABLE 14
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
JISR ESH SHUGUR - ARIHA - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	275.	252.	64.	299.	61.	951.	55.	38.	6.
1979	304.	275.	70.	326.	67.	1042.	56.	38.	6.
1980	336.	300.	76.	356.	73.	1141.	56.	38.	6.
1981	371.	327.	83.	388.	80.	1249.	56.	38.	6.
1982	410.	357.	91.	423.	87.	1368.	56.	38.	6.
1983	453.	389.	99.	461.	95.	1497.	56.	37.	6.
1984	492.	416.	107.	493.	102.	1610.	56.	37.	6.
1985	535.	445.	116.	527.	109.	1732.	57.	37.	6.
1986	582.	476.	125.	563.	117.	1863.	57.	37.	6.
1987	633.	509.	135.	602.	125.	2004.	57.	37.	6.
1988	688.	544.	146.	644.	134.	2156.	57.	37.	6.
1989	748.	582.	158.	688.	143.	2319.	57.	36.	6.
1990	813.	622.	171.	735.	153.	2494.	58.	36.	6.
1991	884.	665.	185.	786.	164.	2684.	58.	36.	6.
1992	961.	711.	200.	840.	175.	2887.	58.	36.	6.
1993	1045.	760.	216.	898.	187.	3106.	58.	36.	6.
1994	1110.	802.	229.	947.	197.	3285.	58.	36.	6.
1995	1179.	846.	243.	999.	208.	3475.	58.	36.	6.
1996	1252.	893.	258.	1054.	219.	3676.	58.	36.	6.
1997	1330.	942.	274.	1112.	231.	3889.	58.	36.	6.
1998	1412.	994.	291.	1173.	244.	4114.	58.	36.	6.
1999	1500.	1049.	309.	1238.	257.	4353.	59.	36.	6.
2000	1593.	1107.	328.	1306.	271.	4605.	59.	35.	6.
2001	1692.	1168.	348.	1378.	286.	4872.	59.	35.	6.
2002	1797.	1232.	369.	1454.	302.	5154.	59.	35.	6.
2003	1908.	1300.	392.	1534.	319.	5453.	59.	35.	6.

TABLE 15
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
JISR ESH SHUGUR - ARIHA - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	173.	205.	56.	300.	48.	782.	48.	46.	6.
1979	191.	224.	61.	327.	52.	855.	49.	45.	6.
1980	211.	244.	67.	357.	57.	936.	49.	45.	6.
1981	233.	266.	73.	389.	62.	1023.	49.	45.	6.
1982	257.	290.	80.	424.	68.	1119.	49.	45.	6.
1983	284.	316.	87.	463.	74.	1224.	49.	45.	6.
1984	309.	338.	94.	495.	79.	1315.	49.	45.	6.
1985	336.	361.	102.	529.	84.	1412.	49.	45.	6.
1986	365.	386.	110.	566.	90.	1517.	50.	45.	6.
1987	397.	413.	119.	605.	96.	1630.	50.	44.	6.
1988	432.	441.	129.	647.	103.	1752.	50.	44.	6.
1989	470.	471.	139.	692.	110.	1882.	50.	44.	6.
1990	511.	503.	150.	740.	118.	2022.	50.	44.	6.
1991	555.	538.	162.	791.	126.	2172.	50.	44.	6.
1992	603.	575.	175.	846.	135.	2334.	50.	44.	6.
1993	655.	615.	189.	904.	144.	2507.	51.	44.	6.
1994	696.	649.	201.	954.	152.	2652.	51.	44.	6.
1995	739.	685.	213.	1006.	160.	2803.	51.	43.	6.
1996	785.	723.	226.	1061.	169.	2964.	51.	43.	6.
1997	834.	763.	240.	1119.	178.	3134.	51.	43.	6.
1998	886.	805.	255.	1181.	188.	3315.	51.	43.	6.
1999	941.	849.	271.	1246.	198.	3505.	51.	43.	6.
2000	999.	896.	288.	1315.	209.	3707.	51.	43.	6.
2001	1061.	945.	306.	1387.	220.	3919.	51.	43.	6.
2002	1127.	997.	325.	1463.	232.	4144.	51.	43.	6.
2003	1197.	1052.	345.	1543.	245.	4382.	51.	43.	6.

TABLE 16
TRAFFIC PROJECTIONS
EXISTING AND PROPOSED ROAD, PRESENT LOADINGS
JISR ESH SHUGUR - ARIHA - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	9.10	6.90	5.50
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	9.10	6.90	5.50
TRUCK(COMB.)	9.10	6.90	5.50

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	448.	457.	120.	599.	109.	1733.	52.	41.	6.
1979	495.	499.	131.	654.	119.	1898.	52.	41.	6.
1980	547.	544.	143.	714.	130.	2078.	53.	41.	6.
1981	604.	594.	156.	779.	142.	2275.	53.	41.	6.
1982	667.	648.	170.	850.	155.	2490.	53.	41.	6.
1983	737.	707.	186.	927.	169.	2726.	53.	41.	6.
1984	801.	756.	201.	991.	181.	2930.	53.	41.	6.
1985	871.	808.	217.	1059.	193.	3148.	53.	41.	6.
1986	947.	864.	235.	1132.	206.	3384.	54.	40.	6.
1987	1029.	924.	254.	1210.	220.	3637.	54.	40.	6.
1988	1119.	988.	275.	1293.	235.	3910.	54.	40.	6.
1989	1216.	1056.	297.	1382.	251.	4202.	54.	40.	6.
1990	1322.	1129.	321.	1477.	268.	4517.	54.	40.	6.
1991	1437.	1207.	347.	1579.	286.	4856.	54.	40.	6.
1992	1562.	1290.	375.	1688.	306.	5221.	55.	40.	6.
1993	1698.	1379.	405.	1804.	327.	5613.	55.	39.	6.
1994	1803.	1455.	430.	1903.	345.	5936.	55.	39.	6.
1995	1915.	1535.	456.	2008.	364.	6278.	55.	39.	6.
199	2034.	1619.	484.	2118.	384.	6639.	55.	39.	6.
1997	2160.	1708.	514.	2234.	405.	7021.	55.	39.	6.
1998	2294.	1802.	545.	2357.	427.	7425.	55.	39.	6.
1999	2436.	1901.	578.	2487.	450.	7852.	55.	39.	6.
2000	2587.	2006.	613.	2624.	475.	8305.	55.	39.	6.
2001	2747.	2116.	650.	2768.	501.	8782.	55.	39.	6.
2002	2917.	2232.	690.	2920.	529.	9288.	55.	39.	6.
2003	3098.	2355.	732.	3081.	558.	9824.	56.	39.	6.

TABLE 17
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UN.T	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	174.	127.	111.	594.	90.	1096.	27.	64.	8.
1979	192.	138.	121.	644.	98.	1193.	28.	64.	8.
1980	212.	150.	132.	698.	106.	1298.	28.	64.	8.
1981	234.	163.	144.	757.	115.	1413.	28.	64.	8.
1982	259.	177.	157.	821.	125.	1539.	28.	64.	8.
1983	286.	192.	171.	890.	136.	1675.	29.	63.	8.
1984	311.	205.	185.	950.	145.	1796.	29.	63.	8.
1985	338.	219.	200.	1014.	155.	1926.	29.	63.	8.
1986	367.	234.	216.	1082.	165.	2064.	29.	63.	8.
1987	399.	250.	233.	1154.	176.	2212.	29.	63.	8.
1988	434.	267.	252.	1231.	188.	2372.	30.	63.	8.
1989	472.	285.	272.	1313.	201.	2543.	30.	62.	8.
1990	513.	304.	294.	1401.	214.	2726.	30.	62.	8.
1991	558.	324.	318.	1495.	228.	2923.	30.	62.	8.
1992	607.	346.	344.	1595.	243.	3135.	30.	62.	8.
1993	660.	369.	372.	1702.	259.	3362.	31.	62.	8.
1994	701.	388.	395.	1791.	272.	3547.	31.	62.	8.
1995	744.	408.	419.	1884.	286.	3741.	31.	62.	8.
1996	790.	429.	445.	1982.	301.	3947.	31.	61.	8.
1997	839.	451.	472.	2085.	317.	4164.	31.	61.	8.
1998	891.	474.	501.	2193.	333.	4392.	31.	61.	8.
1999	946.	499.	532.	2307.	350.	4634.	31.	61.	8.
2000	1005.	525.	564.	2427.	368.	4889.	31.	61.	8.
2001	1067.	552.	598.	2553.	387.	5157.	31.	61.	8.
2002	1133.	581.	634.	2686.	407.	5441.	32.	61.	7.
2003	1203.	611.	673.	2826.	428.	5741.	32.	61.	7.

TABLE 18
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	170.	122.	95.	573.	96.	1056.	28.	63.	9.
1979	188.	132.	104.	621.	104.	1149.	28.	63.	9.
1980	208.	143.	114.	673.	113.	1251.	28.	63.	9.
1981	230.	155.	124.	730.	122.	1361.	28.	63.	9.
1982	254.	168.	135.	791.	132.	1480.	29.	63.	9.
1983	281.	182.	147.	857.	143.	1610.	29.	62.	9.
1984	305.	194.	159.	914.	153.	1725.	29.	62.	9.
1985	332.	207.	172.	975.	163.	1849.	29.	62.	9.
1986	361.	221.	186.	1040.	174.	1982.	29.	62.	9.
1987	392.	236.	201.	1110.	186.	2125.	30.	62.	9.
1988	426.	252.	217.	1184.	198.	2277.	30.	62.	9.
1989	463.	269.	235.	1263.	211.	2441.	30.	61.	9.
1990	503.	287.	254.	1348.	225.	2617.	30.	61.	9.
1991	547.	306.	275.	1438.	240.	2806.	30.	61.	9.
1992	595.	327.	297.	1534.	256.	3009.	31.	61.	9.
1993	647.	349.	321.	1637.	273.	3227.	31.	61.	9.
1994	687.	367.	341.	1722.	287.	3404.	31.	61.	8.
1995	730.	386.	362.	1812.	302.	3592.	31.	61.	8.
1996	775.	406.	384.	1906.	318.	3789.	31.	60.	8.
1997	823.	427.	407.	2005.	335.	3997.	31.	60.	8.
1998	874.	449.	432.	2109.	352.	4216.	31.	60.	8.
1999	928.	472.	458.	2219.	370.	4447.	31.	60.	8.
2000	986.	497.	486.	2334.	389.	4692.	32.	60.	8.
2001	1047.	523.	516.	2455.	409.	4950.	32.	60.	8.
2002	1112.	550.	547.	2583.	430.	5222.	32.	60.	8.
2003	1181.	579.	580.	2717.	452.	5509.	32.	60.	8.

TABLE 19
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
LATTAKIA - HAFFE/SLENFE ROAD JUNCTION - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	344.	249.	206.	1167.	186.	2152.	28.	64.	9.
1979	380.	270.	225.	1265.	202.	2342.	28.	64.	9.
1980	420.	293.	246.	1371.	219.	2549.	28.	63.	9.
1981	464.	318.	269.	1486.	237.	2774.	28.	63.	9.
1982	513.	345.	294.	1611.	257.	3020.	28.	63.	9.
1983	567.	374.	321.	1746.	279.	3287.	29.	63.	8.
1984	616.	399.	347.	1863.	298.	3523.	29.	63.	8.
1985	670.	426.	375.	1986.	318.	3777.	29.	63.	8.
1986	728.	455.	405.	2121.	339.	4048.	29.	62.	8.
1987	791.	485.	438.	2263.	362.	4339.	29.	62.	8.
1988	860.	517.	473.	2415.	386.	4651.	30.	62.	8.
1989	935.	552.	511.	2577.	412.	4987.	30.	62.	8.
1990	1016.	589.	552.	2750.	440.	5347.	30.	62.	8.
1991	1104.	628.	597.	2934.	469.	5732.	30.	62.	8.
1992	1200.	670.	645.	3131.	500.	6146.	30.	61.	8.
1993	1304.	715.	697.	3341.	534.	6591.	31.	61.	8.
1994	1385.	752.	740.	3515.	562.	6954.	31.	61.	8.
1995	1471.	791.	785.	3698.	591.	7336.	31.	61.	8.
1996	1562.	832.	833.	3890.	622.	7739.	31.	61.	8.
1997	1659.	875.	884.	4092.	654.	8164.	31.	61.	8.
1998	1762.	920.	938.	4305.	688.	8613.	31.	61.	8.
1999	1871.	968.	995.	4529.	724.	9087.	31.	61.	8.
2000	1987.	1018.	1056.	4765.	762.	9588.	31.	61.	8.
2001	2110.	1071.	1120.	5013.	802.	10116.	31.	61.	8.
2002	2241.	1127.	1188.	5274.	844.	10674.	32.	61.	8.
2003	2380.	1186.	1260.	5548.	888.	11262.	32.	60.	8.

TABLE 20
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	155.	86.	50.	559.	96.	946.	25.	64.	10.
1979	171.	93.	55.	606.	104.	1029.	26.	64.	10.
1980	189.	101.	60.	657.	113.	1120.	26.	64.	10.
1981	209.	109.	66.	712.	122.	1218.	26.	64.	10.
1982	231.	118.	72.	772.	132.	1325.	26.	64.	10.
1983	255.	128.	79.	837.	143.	1442.	27.	64.	10.
1984	277.	137.	85.	893.	153.	1545.	27.	63.	10.
1985	301.	146.	92.	953.	163.	1655.	27.	63.	10.
1986	327.	156.	99.	1017.	174.	1773.	27.	63.	10.
1987	355.	166.	107.	1085.	186.	1899.	27.	63.	10.
1988	386.	177.	116.	1158.	198.	2035.	28.	63.	10.
1989	420.	189.	125.	1236.	211.	2181.	28.	62.	10.
1990	457.	202.	135.	1319.	225.	2338.	28.	62.	10.
1991	497.	216.	146.	1407.	240.	2506.	28.	62.	10.
1992	540.	230.	158.	1501.	256.	2685.	29.	62.	10.
1993	587.	245.	171.	1602.	273.	2878.	29.	62.	9.
1994	623.	258.	181.	1685.	287.	3034.	29.	62.	9.
1995	662.	271.	192.	1773.	302.	3200.	29.	61.	9.
1996	703.	285.	204.	1865.	318.	3375.	29.	61.	9.
1997	747.	300.	216.	1962.	335.	3560.	29.	61.	9.
1998	793.	316.	229.	2064.	352.	3754.	30.	61.	9.
1999	842.	332.	243.	2171.	370.	3958.	30.	61.	9.
2000	894.	349.	258.	2284.	389.	4174.	30.	61.	9.
2001	949.	367.	274.	2403.	409.	4402.	30.	61.	9.
2002	1008.	386.	291.	2528.	430.	4643.	30.	61.	9.
2003	1070.	406.	309.	2659.	452.	4896.	30.	61.	9.

TABLE 21
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	143.	96.	46.	510.	96.	891.	27.	62.	11.
1979	158.	104.	50.	553.	104.	969.	27.	62.	11.
1980	175.	113.	55.	599.	113.	1055.	27.	62.	11.
1981	193.	122.	60.	649.	122.	1146.	27.	62.	11.
1982	213.	132.	66.	704.	132.	1247.	28.	62.	11.
1983	235.	143.	72.	763.	143.	1356.	28.	62.	11.
1984	255.	153.	78.	814.	153.	1453.	28.	61.	11.
1985	277.	163.	84.	869.	163.	1556.	28.	61.	10.
1986	301.	174.	91.	927.	174.	1667.	28.	61.	10.
1987	327.	186.	98.	989.	186.	1786.	29.	61.	10.
1988	355.	198.	106.	1055.	198.	1912.	29.	61.	10.
1989	386.	211.	115.	1126.	211.	2049.	29.	61.	10.
1990	420.	225.	124.	1201.	225.	2195.	29.	60.	10.
1991	457.	240.	134.	1281.	240.	2352.	30.	60.	10.
1992	497.	256.	145.	1367.	256.	2521.	30.	60.	10.
1993	540.	273.	157.	1459.	273.	2702.	30.	60.	10.
1994	573.	287.	167.	1535.	287.	2849.	30.	60.	10.
1995	609.	302.	177.	1615.	302.	3005.	30.	60.	10.
1996	647.	318.	188.	1699.	318.	3170.	30.	60.	10.
1997	687.	335.	199.	1787.	335.	3343.	31.	59.	10.
1998	730.	352.	211.	1880.	352.	3525.	31.	59.	10.
1999	775.	370.	224.	1978.	370.	3717.	31.	59.	10.
2000	823.	389.	238.	2081.	389.	3920.	31.	59.	10.
2001	874.	409.	253.	2189.	409.	4134.	31.	59.	10.
2002	928.	430.	268.	2303.	430.	4359.	31.	59.	10.
2003	986.	452.	284.	2423.	452.	4597.	31.	59.	10.

TABLE 22
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
HAFFE/SLENFE ROAD JUNCTION - JISR ESH SHUGUR - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	298.	182.	96.	1069.	192.	1837.	26.	63.	10.
1979	329.	197.	105.	1159.	208.	1998.	26.	63.	10.
1980	364.	214.	115.	1256.	225.	2174.	27.	63.	10.
1981	402.	232.	126.	1362.	244.	2366.	27.	63.	10.
1982	444.	251.	138.	1476.	264.	2573.	27.	63.	10.
1983	491.	272.	151.	1600.	286.	2800.	27.	63.	10.
1984	534.	290.	163.	1707.	305.	2999.	27.	62.	10.
1985	580.	309.	176.	1821.	325.	3211.	28.	62.	10.
1986	630.	330.	190.	1943.	347.	3440.	28.	62.	10.
1987	685.	352.	205.	2073.	370.	3685.	28.	62.	10.
1988	745.	376.	222.	2212.	395.	3950.	28.	62.	10.
1989	810.	401.	240.	2360.	421.	4232.	29.	61.	10.
1990	880.	428.	259.	2518.	449.	4534.	29.	61.	10.
1991	957.	457.	280.	2687.	479.	4860.	29.	61.	10.
1992	1040.	488.	303.	2867.	511.	5209.	29.	61.	10.
1993	1130.	521.	328.	3059.	545.	5583.	30.	61.	10.
1994	1200.	548.	348.	3218.	573.	5887.	30.	61.	10.
1995	1274.	576.	369.	3385.	603.	6207.	30.	60.	10.
1996	1353.	606.	392.	3561.	634.	6546.	30.	60.	10.
1997	1437.	638.	416.	3746.	667.	6904.	30.	60.	10.
1998	1526.	671.	441.	3941.	702.	7281.	30.	60.	10.
1999	1621.	706.	468.	4146.	739.	7680.	30.	60.	10.
2000	1722.	743.	497.	4362.	777.	8101.	30.	60.	10.
2001	1829.	782.	527.	4589.	817.	8544.	31.	60.	10.
2002	1942.	823.	559.	4828.	859.	9011.	31.	60.	10.
2003	2062.	866.	593.	5079.	904.	9504.	31.	60.	10.

TABLE 23
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
JISR ESH SHUGUR BYPASS - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	128.	53.	11.	500.	88.	780.	23.	66.	11.
1979	141.	57.	12.	542.	95.	847.	23.	65.	11.
1980	156.	62.	13.	588.	103.	922.	24.	65.	11.
1981	172.	67.	14.	637.	112.	1002.	24.	65.	11.
1982	190.	73.	15.	691.	121.	1090.	24.	65.	11.
1983	210.	79.	16.	749.	131.	1185.	24.	65.	11.
1984	228.	84.	17.	799.	140.	1268.	25.	64.	11.
1985	248.	90.	18.	853.	149.	1358.	25.	64.	11.
1986	270.	96.	19.	910.	159.	1454.	25.	64.	11.
1987	293.	102.	21.	971.	170.	1557.	25.	64.	11.
1988	318.	109.	23.	1036.	181.	1667.	26.	64.	11.
1989	346.	116.	25.	1105.	193.	1785.	26.	63.	11.
1990	376.	124.	27.	1179.	206.	1912.	26.	63.	11.
1991	409.	132.	29.	1258.	220.	2048.	26.	63.	11.
1992	445.	141.	31.	1342.	235.	2194.	27.	63.	11.
1993	484.	150.	34.	1432.	251.	2351.	27.	62.	11.
1994	514.	158.	36.	1506.	264.	2478.	27.	62.	11.
1995	546.	166.	38.	1584.	278.	2612.	27.	62.	11.
1996	580.	175.	40.	1666.	292.	2753.	27.	62.	11.
1997	616.	184.	42.	1753.	307.	2902.	28.	62.	11.
1998	654.	194.	45.	1844.	323.	3060.	28.	62.	11.
1999	695.	204.	48.	1940.	340.	3227.	28.	62.	11.
2000	738.	215.	51.	2041.	358.	3403.	28.	61.	11.
2001	784.	226.	54.	2147.	377.	3588.	28.	61.	11.
2002	833.	238.	57.	2259.	397.	3784.	28.	61.	10.
2003	885.	250.	60.	2376.	418.	3989.	28.	61.	10.

TABLE 24
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
JISR ESH SHUGUR BYPASS - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	126.	67.	16.	418.	86.	713.	27.	61.	12.
1979	139.	73.	17.	453.	93.	775.	27.	61.	12.
1980	154.	79.	19.	491.	101.	844.	28.	60.	12.
1981	170.	86.	21.	532.	109.	918.	28.	60.	12.
1982	188.	93.	23.	577.	118.	999.	28.	60.	12.
1983	208.	101.	25.	625.	128.	1087.	28.	60.	12.
1984	226.	108.	27.	667.	137.	1165.	29.	60.	12.
1985	246.	115.	29.	712.	146.	1248.	29.	59.	12.
1986	267.	123.	31.	760.	156.	1337.	29.	59.	12.
1987	290.	131.	34.	811.	166.	1432.	29.	59.	12.
1988	315.	140.	37.	865.	177.	1534.	30.	59.	12.
1989	342.	149.	40.	923.	189.	1643.	30.	59.	12.
1990	372.	159.	43.	985.	202.	1761.	30.	58.	11.
1991	404.	170.	46.	1051.	216.	1887.	30.	58.	11.
1992	439.	181.	50.	1121.	230.	2021.	31.	58.	11.
1993	477.	193.	54.	1196.	245.	2165.	31.	58.	11.
1994	507.	203.	57.	1258.	258.	2283.	31.	58.	11.
1995	538.	214.	60.	1323.	271.	2406.	31.	57.	11.
1996	571.	225.	64.	1392.	285.	2537.	31.	57.	11.
1997	606.	237.	68.	1464.	300.	2675.	32.	57.	11.
1998	644.	249.	72.	1540.	316.	2821.	32.	57.	11.
1999	684.	262.	76.	1620.	332.	2974.	32.	57.	11.
2000	726.	276.	81.	1704.	349.	3136.	32.	57.	11.
2001	771.	290.	86.	1793.	367.	3307.	32.	57.	11.
2002	819.	305.	91.	1886.	386.	3487.	32.	57.	11.
2003	870.	321.	97.	1984.	406.	3678.	32.	57.	11.

TABLE 25
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
JISR ESH SHUGUR BYPASS - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	254.	120.	27.	918.	174.	1493.	25.	63.	12.
1979	281.	130.	29.	995.	189.	1624.	25.	63.	12.
1980	311.	141.	32.	1079.	205.	1768.	26.	63.	12.
1981	344.	153.	35.	1170.	222.	1924.	26.	63.	12.
1982	380.	166.	38.	1268.	241.	2093.	26.	62.	12.
1983	420.	180.	41.	1375.	261.	2277.	26.	62.	11.
1984	457.	192.	44.	1467.	278.	2438.	27.	62.	11.
1985	497.	205.	48.	1565.	297.	2612.	27.	62.	11.
1986	540.	219.	52.	1670.	317.	2798.	27.	62.	11.
1987	587.	234.	56.	1782.	338.	2997.	27.	61.	11.
1988	638.	250.	61.	1901.	361.	3211.	28.	61.	11.
1989	694.	267.	66.	2028.	385.	3440.	28.	61.	11.
1990	754.	285.	71.	2164.	411.	3685.	28.	61.	11.
1991	820.	304.	77.	2309.	439.	3949.	28.	60.	11.
1992	891.	324.	83.	2464.	468.	4230.	29.	60.	11.
1993	969.	346.	90.	2629.	499.	4533.	29.	60.	11.
1994	1029.	364.	95.	2766.	525.	4779.	29.	60.	11.
1995	1093.	383.	101.	2910.	552.	5039.	29.	60.	11.
1996	1161.	403.	107.	3061.	581.	5313.	29.	60.	11.
1997	1233.	424.	114.	3220.	611.	5602.	30.	60.	11.
1998	1309.	446.	121.	3387.	643.	5906.	30.	59.	11.
1999	1390.	469.	128.	3563.	676.	6226.	30.	59.	11.
2000	1476.	493.	136.	3748.	711.	6564.	30.	59.	11.
2001	1568.	519.	144.	3943.	748.	6922.	30.	59.	11.
2002	1665.	546.	153.	4148.	787.	7299.	30.	59.	11.
2003	1768.	574.	162.	4364.	828.	7696.	30.	59.	11.

TABLE 26
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
JISR ESH SHUGUR - ARIHA - EASTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	275.	252.	64.	550.	112.	1253.	42.	49.	9.
1979	304.	273.	70.	596.	121.	1364.	42.	49.	9.
1980	336.	296.	76.	646.	131.	1485.	43.	49.	9.
1981	371.	321.	83.	700.	142.	1617.	43.	48.	9.
1982	410.	348.	91.	759.	154.	1762.	43.	48.	9.
1983	453.	377.	99.	823.	167.	1919.	43.	48.	9.
1984	492.	402.	107.	878.	178.	2057.	43.	48.	9.
1985	535.	429.	116.	937.	190.	2207.	44.	48.	9.
1986	582.	458.	125.	1000.	203.	2368.	44.	48.	9.
1987	633.	489.	135.	1067.	217.	2541.	44.	47.	9.
1988	688.	522.	146.	1138.	232.	2726.	44.	47.	9.
1989	748.	557.	158.	1214.	248.	2925.	45.	47.	8.
1990	813.	594.	171.	1295.	265.	3138.	45.	47.	8.
1991	884.	634.	185.	1382.	283.	3368.	45.	47.	8.
1992	96[illegible]	676.	200.	1475.	302.	3614.	45.	46.	8.
1993	1045.	721.	216.	1574.	322.	3878.	46.	46.	8.
1994	1110.	758.	229.	1656.	339.	4092.	46.	45.	8.
1995	1179.	797.	243.	1742.	357.	4318.	46.	46.	8.
1996	1252.	838.	258.	1833.	376.	4557.	46.	46.	8.
1997	1330.	882.	274.	1928.	396.	4810.	46.	46.	8.
1998	1412.	928.	291.	2028.	417.	5076.	46.	46.	8.
1999	1500.	976.	309.	2133.	439.	5357.	46.	46.	8.
2000	1593.	1027.	328.	2244.	462.	5654.	46.	45.	8.
2001	1692.	1080.	348.	2361.	486.	5967.	46.	45.	8.
2002	1797.	1136.	369.	2484.	511.	6297.	47.	45.	8.
2003	1908.	1195.	392.	2613.	538.	6646.	47.	45.	8.

TABLE 27
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
JISR ESH SHUGUR - ARIHA - WESTBOUND

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UN.T	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	173.	205.	56.	552.	88.	1074.	35.	57.	8.
1979	191.	222.	61.	598.	95.	1167.	35.	56.	8.
1980	211.	241.	67.	648.	103.	1270.	36.	56.	8.
1981	233.	261.	73.	702.	112.	1381.	36.	56.	8.
1982	257.	283.	80.	761.	121.	1502.	36.	56.	8.
1983	284.	307.	87.	825.	131.	1634.	36.	56.	8.
1984	309.	328.	94.	880.	140.	1751.	36.	56.	8.
1985	336.	350.	102.	939.	149.	1876.	37.	55.	8.
1986	365.	373.	110.	1002.	159.	2009.	37.	55.	8.
1987	397.	398.	119.	1069.	170.	2153.	37.	55.	8.
1988	432.	425.	129.	1141.	181.	2308.	37.	55.	8.
1989	470.	453.	139.	1217.	193.	2472.	37.	55.	8.
1990	511.	483.	150.	1299.	206.	2649.	38.	55.	8.
1991	555.	515.	162.	1386.	220.	2838.	38.	55.	8.
1992	603.	550.	175.	1479.	235.	3042.	38.	54.	8.
1993	655.	587.	189.	1578.	251.	3260.	38.	54.	8.
1994	696.	618.	201.	1660.	264.	3439.	38.	54.	8.
1995	739.	650.	213.	1746.	278.	3626.	38.	54.	8.
1996	785.	684.	226.	1837.	292.	3824.	38.	54.	8.
1997	834.	720.	240.	1933.	307.	4034.	39.	54.	8.
1998	886.	757.	255.	2034.	323.	4255.	39.	54.	8.
1999	941.	796.	271.	2140.	340.	4488.	39.	54.	8.
2000	999.	837.	288.	2251.	358.	4733.	39.	54.	8.
2001	1061.	881.	306.	2368.	377.	4993.	39.	54.	8.
2002	1127.	927.	325.	2491.	397.	5267.	39.	53.	8.
2003	1197.	975.	345.	2621.	418.	5556.	39.	53.	8.

TABLE 28
TRAFFIC PROJECTIONS
PROPOSED ROAD, LEGAL LOADINGS
JISR ESH SHUGUR - ARIHA - TWO DIRECTIONS

GROWTH RATES

	1978-83	1983-93	1993-2003
CAR	10.50	8.70	6.20
PICK-UP	8.40	6.70	5.20
BUS	9.20	8.10	6.10
TRUCK(SINGLE-UNIT)	8.40	6.70	5.20
TRUCK(COMB.)	8.40	6.70	5.20

YEAR	CAR	PICKUP	BUS	TRUCK SINGLE-UNIT	TRUCK COMB.	TOTAL	P.C. OF TOTAL CAR+P.U.	BUS+S.U.T.	TRUCK COMB.
1978	448.	457.	120.	1102.	200.	2327.	39.	53.	9.
1979	495.	495.	131.	1195.	217.	2533.	39.	52.	9.
1980	547.	537.	143.	1295.	235.	2757.	39.	52.	9.
1981	604.	582.	156.	1404.	255.	3001.	40.	52.	8.
1982	667.	631.	170.	1522.	276.	3266.	40.	52.	8.
1983	737.	684.	186.	1650.	299.	3556.	40.	52.	8.
1984	801.	730.	201.	1761.	319.	3812.	40.	51.	8.
1985	871.	779.	217.	1879.	340.	4086.	40.	51.	8.
1986	947.	831.	235.	2005.	363.	4381.	41.	51.	8.
1987	1029.	887.	254.	2139.	387.	4696.	41.	51.	8.
1988	1119.	946.	275.	2282.	413.	5035.	41.	51.	8.
1989	1216.	1009.	297.	2435.	441.	5398.	41.	51.	8.
1990	1322.	1077.	321.	2598.	471.	5789.	41.	50.	8.
1991	1437.	1149.	347.	2772.	503.	6208.	42.	50.	8.
1992	1562.	1226.	375.	2958.	537.	6658.	42.	50.	8.
1993	1698.	1308.	405.	3156.	573.	7140.	42.	50.	8.
1994	1803.	1376.	430.	3320.	603.	7532.	42.	50.	8.
1995	1915.	1448.	456.	3493.	634.	7946.	42.	50.	8.
1996	2034.	1523.	484.	3675.	667.	8383.	42.	50.	8.
1997	2160.	1602.	514.	3866.	702.	8844.	43.	50.	8.
1998	2294.	1685.	545.	4067.	739.	9330.	43.	49.	8.
1999	2436.	1773.	578.	4278.	777.	9842.	43.	49.	8.
2000	2587.	1865.	613.	4500.	817.	10382.	43.	49.	8.
2001	2747.	1962.	650.	4734.	859.	10952.	43.	49.	8.
2002	2917.	2064.	690.	4980.	904.	11555.	43.	49.	8.
2003	3098.	2171.	732.	5239.	951.	12191.	43.	49.	8.

TABLE 29

PRESENT PRACTICES
WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Lattakia to Haffe/Slenfe Road Junction

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire, medium 1/	41.2					
empty		0.05	11.7	3/	71.7	0.01
loaded		4.10	88.3	1.49	28.3	0.48
2 axle, 6 tire, large 1/	41.2					
empty		0.27	11.7	0.01	71.7	0.08
loaded		31.11	88.3	11.32	28.3	3.63
3 axle, 10 tire	3.8					
empty		0.26	12.5	3/	61.5	0.01
loaded		12.17	87.5	0.40	38.5	0.18
COMBINATION VEHICLES						
Truck + Trailer (2 axles + 2 axles)	4.0					
empty		0.51	3.1	3/	85.7	0.02
loaded		63.60	96.9	2.47	14.3	0.36
Tractor + ½ Trailer 2/ (2 axles + 2 axles)	8.6					
empty		0.34	6.0	3/	77.0	0.02
loaded		37.33	94.0	3.02	23.0	0.74
Tractor + ½ Trailer 2/ (3 axles + 2 axles)	1.2					
empty		0.19	6.0	3/	77.0	3/
loaded		13.27	94.0	0.15	23.0	0.04
TOTAL	100.0	-	-	18.86	-	5.57

1/ Estimated at 50/50 proportion.

2/ Based upon truck inventory proportions, Table C-2, Tartous-Lattakia Draft Final Report.

3/ Less than 0.01.

TABLE 30

PRESENT PRACTICES
WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Haffe/Slenfe Road Junction - Jish Esh Shugur

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire, medium 1/	40.85					
empty		0.05	11.7	3/	71.7	0.01
loaded		4.10	88.3	1.48	28.3	0.47
2 axle, 6 tire, large 1/	40.85					
empty		0.27	11.7	0.01	71.7	0.08
loaded		31.11	88.3	11.22	28.3	3.60
3 axle, 10 tire	3.1					
empty		0.26	12.5	3/	61.5	3/
loaded		12.17	87.5	0.33	38.5	0.15
COMBINATION VEHICLES						
Truck + Trailer (2 axles + 2 axles)	4.4					
empty		0.51	3.1	3/	85.7	0.02
loaded		63.60	96.9	2.71	14.3	0.40
Tractor + ½ Trailer 2/ (2 axles + 2 axles)	9.5					
empty		0.34	6.0	3/	77.0	0.02
loaded		37.33	94.0	3.33	23.0	0.82
Tractor + ½ Trailer 2/ (3 axles + 2 axles)	1.3					
empty		0.19	6.0	3/	77.0	3/
loaded		13.27	94.0	0.16	23.0	0.04
TOTAL	100.0	-	-	19.24	-	5.61

1/ Estimated at 50/50 proportion.

2/ Based upon truck inventory, Table C-2, Tartous-Lattakia Draft Final Report

3/ Less than 0.01.

TABLE 31

PRESENT PRACTICES
WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Jisr Esh Shugur Bypass

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire, medium 1/	40.4					
empty		0.05	11.7	3/	71.7	0.01
loaded		4.10	88.3	1.46	28.3	0.47
2 axle, 6 tire, large 1/	40.4					
empty		0.27	11.7	0.01	71.7	0.08
loaded		31.11	88.3	11.10	28.3	3.56
3 axle, 10 tire	3.2					
empty		0.26	12.5	3/	61.5	0.01
loaded		12.17	87.5	0.34	38.5	0.15
COMBINATION VEHICLES						
Truck + Trailer (2 axles + 2 axles)	4.0					
empty		0.51	3.1	3/	85.7	0.02
loaded		63.60	96.9	2.47	14.3	0.36
Tractor + ½ Trailer 2/ (2 axles + 2 axles)	10.5					
empty		0.34	6.0	3/	77.0	0.03
loaded		37.33	94.0	3.68	23.0	0.90
Tractor + ½ Trailer 2/ (3 axles + 2 axles)	1.5					
empty		0.19	6.0	3/	77.0	3/
loaded		13.27	94.0	0.19	23.0	0.05
TOTAL	100.0	-	-	19.25	-	5.64

1/ Estimated at 50/50 proportion.

2/ Based upon truck inventory, Table C-2, Tartous-Lattakia Draft Final Report.

3/ Less than 0.01.

TABLE 32

PRESENT PRACTICES
WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTIONS: Jisr Esh Shugur - Ariha

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire, medium 1/	39.1					
empty		0.05	11.7	3/	71.7	0.01
loaded		4.10	88.3	1.42	28.3	0.45
2 axle, 6 tire, large 1/	39.1					
empty		0.27	11.7	0.01	71.7	0.08
loaded		31.11	88.3	10.74	28.3	3.44
3 axle, 10 tire	6.4					
empty		0.26	12.5	3/	61.5	0.01
loaded		12.17	87.5	0.68	38.5	0.30
COMBINATION VEHICLES						
Truck + Trailer (2 axles + 2 axles)	4.9					
empty		0.51	3.1	3/	85.7	0.02
loaded		63.60	96.9	3.02	14.3	0.45
Tractor + ½ Trailer 2/ (2 axles + 2 axles)	9.2					
empty		0.34	6.0	3/	77.0	0.02
loaded		37.33	94.0	3.23	23.0	0.79
Tractor + ½ Trailer 2/ (3 axles + 2 axles)	1.3					
empty		0.19	6.0	3/	77.0	3/
loaded		13.27	94.0	0.16	23.0	0.04
TOTAL	100.0	-	-	19.26	-	5.61

1/ Estimated at 50/50 proportion.

2/ Based upon truck inventory, Table C-2, Tartous-Lattakia Draft Final Report.

3/ Less than 0.01.

TABLE 33
LATTAKIA TO ARIHA - PRESENT PRACTICES
LATTAKIA TO HAFFE/SLENFE ROAD JUNCTION
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

	TRUCK (F=12.30)			BUS (F=0.05)			TRUCK + BUS	
YEAR	VOLUME	ANNUAL EAL	CUMUL. EAL	VOLUME	ANNUAL EAL	CUMUL. EAL	ANNUAL EAL	CUMUL. EAL
1978	735.	3300.	3300.	206.	4.	4.	3303.	3303.
1979	802.	3600.	6900.	225.	4.	8.	3604.	6907.
1980	875.	3928.	10828.	246.	4.	12.	3932.	10839.
1981	954.	4285.	15113.	268.	5.	17.	4289.	15129.
1982	1041.	4675.	19788.	293.	5.	23.	4680.	19810.
1983	1136.	5100.	24888.	320.	6.	28.	5106.	24916.
1984	1214.	5452.	30340.	346.	6.	35.	5458.	30375.
1985	1298.	5829.	36169.	374.	7.	42.	5835.	36210.
1986	1388.	6231.	42400.	404.	7.	49.	6238.	42448.
1987	1484.	6661.	49061.	437.	8.	57.	6668.	49117.
1988	1586.	7120.	56181.	472.	9.	66.	7128.	56246.
1989	1695.	7612.	63792.	510.	9.	75.	7620.	63867.
1990	1812.	8137.	71929.	552.	10.	85.	8146.	72014.
1991	1937.	8698.	80627.	596.	11.	96.	8709.	80723.
1992	2071.	9298.	89926.	645.	12.	108.	9310.	90033.
1993	2214.	9940.	99866.	697.	13.	120.	9952.	99986.
1994	2336.	10487.	110353.	740.	13.	134.	10500.	110486.
1995	2464.	11063.	121416.	785.	14.	148.	11077.	121564.
1996	2600.	11672.	133088.	832.	15.	163.	11687.	133251.
1997	2743.	12314.	145402.	883.	16.	179.	12330.	145581.
1998	2894.	12991.	158393.	937.	17.	197.	13008.	158589.
1999	3053.	13706.	172099.	994.	18.	215.	13723.	172313.
2000	3221.	14460.	186558.	1055.	19.	234.	14478.	186792.
2001	3398.	15255.	201813.	1119.	20.	254.	15275.	202067.
2002	3585.	16094.	217907.	1188.	22.	276.	16115.	218182.
2003	3782.	16979.	234886.	1260.	23.	299.	17001.	235184.

TABLE 34
LATTAKIA TO ARIHA - PRESENT PRACTICES
LATTAKIA TO HAFFE/SLENFE ROAD JUNCTION
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

	TRUCK (F=18.86)			BUS (F=0.05)			TRUCK + BUS	
YEAR	VOLUME	ANNUAL EAL	CUMUL. EAL	VOLUME	ANNUAL EAL	CUMUL. EAL	ANNUAL EAL	CUMUL. EAL
1978	372.	2561.	2561.	111.	2.	2.	2562.	2562.
1979	406.	2794.	5355.	121.	2.	4.	2796.	5358.
1980	443.	3048.	8403.	132.	2.	7.	3050.	8409.
1981	483.	3325.	11728.	145.	3.	9.	3328.	11737.
1982	527.	3628.	15356.	158.	3.	12.	3630.	15368.
1983	575.	3958.	19315.	172.	3.	15.	3961.	19329.
1984	615.	4231.	23546.	186.	3.	19.	4234.	23564.
1985	7.	4523.	28069.	201.	4.	22.	4526.	28091.
1986	702.	4835.	32905.	218.	4.	26.	4839.	32930.
1987	751.	5169.	38074.	235.	4.	31.	5173.	38104.
1988	803.	5526.	43599.	254.	5.	35.	5530.	43634.
1989	858.	5907.	49506.	275.	5.	40.	5912.	49546.
1990	917.	6315.	55821.	297.	5.	46.	6320.	55866.
1991	981.	6750.	62571.	321.	6.	52.	6756.	62622.
1992	1048.	7216.	69787.	347.	6.	58.	7222.	69845.
1993	1121.	7714.	77501.	376.	7.	65.	7720.	77566.
1994	1182.	8138.	85640.	398.	7.	72.	8145.	85711.
1995	1247.	8586.	94225.	423.	8.	80.	8593.	94305.
1996	1316.	9058.	103283.	449.	8.	88.	9066.	103371.
1997	1388.	9556.	112840.	476.	9.	97.	9564.	112936.
1998	1465.	10082.	122922.	505.	9.	106.	10091.	123027.
1999	1545.	10636.	133558.	536.	10.	116.	10646.	133673.
2000	1630.	11221.	144779.	568.	10.	126.	11231.	144905.
2001	1720.	11839.	156618.	603.	11.	137.	11849.	156754.
2002	1814.	12490.	169108.	640.	12.	149.	12501.	169256.
2003	1914.	13177.	182284.	679.	12.	161.	13188.	182445.

TABLE 35
LATTAKIA TO ARIHA - PRESENT PRACTICES
LATTAKIA TO HAFFE/SLENFE ROAD JUNCTION
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 5.57) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	363.	738.	738.	95.	2.	2.	739.	739.
1979	396.	805.	1543.	104.	2.	4.	807.	1546.
1980	432.	878.	2422.	113.	2.	6.	880.	2427.
1981	471.	958.	3380.	124.	2.	8.	960.	3387.
1982	514.	1046.	4426.	135.	2.	10.	1048.	4435.
1983	561.	1141.	5566.	148.	3.	13.	1143.	5579.
1984	600.	1219.	6786.	159.	3.	16.	1222.	6801.
1985	641.	1304.	8089.	172.	3.	19.	1306.	8108.
1986	685.	1394.	9483.	186.	3.	23.	1396.	9505.
1987	733.	1490.	10972.	201.	4.	26.	1493.	10998.
1988	783.	1592.	12565.	218.	4.	30.	1596.	12595.
1989	837.	1702.	14267.	235.	4.	35.	1706.	14301.
1990	895.	1820.	16087.	254.	5.	39.	1824.	16126.
1991	957.	1945.	18032.	275.	5.	44.	1950.	18076.
1992	1023.	2080.	20112.	297.	5.	50.	2085.	20161.
1993	1093.	2223.	22335.	321.	6.	55.	2228.	22390.
1994	1154.	2345.	24680.	341.	6.	62.	2351.	24742.
1995	1217.	2474.	27155.	362.	7.	68.	2480.	27223.
1996	1284.	2610.	29765.	384.	7.	75.	2617.	29840.
1997	1355.	2754.	32519.	407.	7.	83.	2761.	32601.
1998	1429.	2905.	35425.	432.	8.	91.	2913.	35515.
1999	1508.	3065.	38490.	459.	8.	99.	3073.	38588.
2000	1591.	3234.	41724.	487.	9.	108.	3242.	41831.
2001	1678.	3412.	45136.	516.	9.	117.	3421.	45252.
2002	1770.	3599.	48735.	548.	10.	127.	3609.	48862.
2003	1868.	3797.	52532.	581.	11.	138.	3807.	52670.

TABLE 36
LATTAKIA TO ARIHA - PRESENT PRACTICES
HAFFE/SLENFE ROAD JUNCTION TO JISR ESH SHUGUR
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=12.69) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	685.	3173.	3173.	96.	2.	2.	3174.	3174.
1979	747.	3462.	6634.	105.	2.	4.	3463.	6638.
1980	815.	3777.	10411.	114.	2.	6.	3778.	10416.
1981	890.	4120.	14531.	125.	2.	8.	4122.	14539.
1982	970.	4495.	19026.	137.	2.	11.	4497.	19036.
1983	1059.	4904.	23930.	149.	3.	13.	4906.	23943.
1984	1132.	5243.	29173.	161.	3.	16.	5245.	29189.
1985	1210.	5604.	34777.	174.	3.	19.	5607.	34796.
1986	1293.	5991.	40.58.	188.	3.	23.	5994.	40791.
1987	1383.	6404.	47173.	204.	4.	27.	6408.	47199.
1988	1478.	6846.	54019.	220.	4.	31.	6850.	54049.
1989	1580.	7319.	61338.	238.	4.	35.	7323.	61372.
1990	1689.	7824.	69162.	257.	5.	40.	7828.	69201.
1991	1806.	8364.	77525.	278.	5.	45.	8368.	77569.
1992	1930.	8941.	86466.	300.	5.	50.	8946.	86515.
1993	2063.	9558.	9-023.	325.	6.	56.	9563.	96079.
1994	2177.	10083.	106107.	345.	6.	62.	10089.	106168.
1995	2297.	10638.	116744.	366.	7.	69.	10644.	116813.
1996	2423.	11223.	127967.	388.	7.	76.	11229.	128043.
1997	2556.	11840.	139807.	412.	8.	84.	11847.	139890.
1998	2697.	12491.	152299.	437.	8.	92.	12499.	152390.
1999	2845.	13178.	165477.	463.	8.	100.	13186.	165576.
2000	3002.	13903.	179380.	492.	9.	109.	13912.	179489.
2001	3167.	14668.	194048.	522.	10.	119.	14677.	194165.
2002	3341.	15475.	209522.	553.	10.	129.	15484.	209651.
2003	3525.	16326.	225848.	587.	11.	139.	16336.	225987.

TABLE 37
LATTAKIA TO ARIHA - PRESENT PRACTICES
HAFFE/SLENFE ROAD JUNCTION TO JISR ESH SHUGUR
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=19.24) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	356.	2500.	2500.	50.	1.	1.	2500.	2500.
1979	388.	2728.	5228.	55.	1.	2.	2728.	5229.
1980	424.	2976.	8203.	60.	1.	3.	2976.	8206.
1981	462.	3247.	11450.	65.	1.	4.	3247.	11454.
1982	504.	3542.	14992.	71.	1.	5.	3543.	14997.
1983	550.	3864.	18856.	78.	1.	7.	3865.	18863.
1984	588.	4131.	22987.	84.	2.	8.	4132.	22995.
1985	629.	4416.	27403.	91.	2.	10.	4417.	27413.
1986	672.	4721.	32124.	98.	2.	12.	4722.	32135.
1987	719.	5046.	37170.	106.	2.	14.	5048.	37184.
1988	768.	5395.	42565.	115.	2.	16.	5396.	42580.
1989	821.	5767.	48332.	124.	2.	18.	5769.	48349.
1990	878.	6165.	54496.	134.	2.	21.	6167.	54517.
1991	938.	6590.	61087.	145.	3.	23.	6592.	61109.
1992	1003.	7045.	68131.	157.	3.	26.	7047.	68157.
1993	1072.	7531.	75662.	169.	3.	29.	7534.	75691.
1994	1131.	7945.	83607.	179.	3.	32.	7948.	83639.
1995	1194.	8382.	91990.	190.	3.	36.	8385.	92025.
1996	1259.	8843.	100833.	202.	4.	40.	8846.	100872.
1997	1328.	9330.	110162.	214.	4.	44.	9333.	110205.
1998	1402.	9843.	120005.	227.	4.	48.	9846.	120052.
1999	1479.	10384.	130389.	241.	4.	52.	10388.	130440.
2000	1560.	10955.	141344.	256.	5.	57.	10959.	141400.
2001	1646.	11558.	152902.	272.	5.	62.	11562.	152963.
2002	1736.	12193.	165095.	288.	5.	67.	12198.	165161.
2003	1832.	12864.	177959.	306.	6.	73.	12869.	178031.

TABLE 38
LATTAKIA TO ARIHA - PRESENT PRACTICES
HAFFE/SLENFE ROAD JUNCTION TO JISR ESH SHUGUR
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 5.61) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	329.	674.	674.	46.	1.	1.	674.	674.
1979	359.	735.	1409.	50.	1.	2.	735.	1410.
1980	392.	802.	2211.	55.	1.	3.	802.	2213.
1981	427.	875.	3085.	60.	1.	4.	875.	3089.
1982	466.	954.	4040.	65.	1.	5.	955.	4044.
1983	509.	1041.	5081.	71.	1.	6.	1042.	5087.
1984	544.	1113.	6194.	77.	1.	8.	1114.	6202.
1985	581.	1190.	7384.	83.	2.	9.	1191.	7393.
1986	621.	1272.	8656.	90.	2.	11.	1273.	8667.
1987	664.	1360.	10016.	98.	2.	13.	1361.	10028.
1988	710.	1454.	11470.	105.	2.	15.	1455.	11484.
1989	759.	1554.	13024.	114.	2.	17.	1556.	13040.
1990	811.	1661.	14685.	123.	2.	19.	1663.	14703.
1991	867.	1776.	16461.	133.	2.	21.	1778.	16482.
1992	927.	1898.	18359.	144.	3.	24.	1900.	18383.
1993	991.	2029.	20388.	156.	3.	27.	2032.	20415.
1994	1046.	2141.	22529.	165.	3.	30.	2143.	22559.
1995	1103.	2259.	24788.	175.	3.	33.	2261.	24821.
1996	1164.	2383.	27171.	186.	3.	36.	2386.	27207.
1997	1228.	2514.	29685.	197.	4.	40.	2517.	29725.
1998	1295.	2652.	32337.	209.	4.	44.	2656.	32381.
1999	1367.	2798.	35135.	222.	4.	48.	2802.	35183.
2000	1442.	2952.	38087.	236.	4.	52.	2956.	38139.
2001	1521.	3114.	41202.	250.	5.	57.	3118.	41258.
2002	1605.	3286.	44487.	265.	5.	62.	3290.	44549.
2003	1693.	3466.	47954.	281.	5.	67.	3471.	48020.

TABLE 39
LATTAKIA TO ARIHA - PRESENT PRACTICES
JISR ESH SHUGUR BYPASS
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=12.97) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	594.	2812.	2812.	27.	0.	0.	2812.	2812.
1979	648.	3068.	5880.	29.	1.	1.	3068.	5880.
1980	707.	3347.	9227.	32.	1.	2.	3347.	9228.
1981	771.	3652.	12879.	35.	1.	2.	3652.	12880.
1982	842.	3984.	16863.	38.	1.	3.	3984.	16865.
1983	918.	4347.	21209.	42.	1.	4.	4347.	21212.
1984	981.	4646.	25856.	45.	1.	5.	4647.	25860.
1985	1049.	4967.	30823.	49.	1.	5.	4967.	30828.
1986	1122.	5310.	36133.	53.	1.	6.	5310.	36138.
1987	1199.	5676.	41809.	57.	1.	7.	5677.	41816.
1988	1282.	6068.	47876.	62.	1.	9.	6068.	47885.
1989	1370.	6486.	54363.	67.	1.	10.	6487.	54372.
1990	1465.	6934.	61297.	72.	1.	11.	6935.	61308.
1991	1566.	7412.	68710.	76.	1.	13.	7413.	68722.
1992	1674.	7924.	76633.	85.	2.	14.	7925.	76647.
1993	1789.	8471.	85104.	91.	2.	16.	8472.	85119.
1994	1888.	8937.	94041.	97.	2.	18.	8938.	94058.
1995	1992.	9428.	103469.	103.	2.	19.	9429.	103488.
1996	2101.	9947.	113416.	109.	2.	21.	9948.	113436.
1997	2217.	10494.	123909.	116.	2.	24.	10495.	123932.
1998	2339.	11071.	134980.	123.	2.	26.	11073.	135005.
1999	2467.	11680.	146660.	130.	2.	28.	11682.	146688.
2000	2603.	12322.	158982.	138.	3.	31.	12324.	159012.
2001	2746.	13000.	171982.	147.	3.	33.	13002.	172015.
2002	2897.	13715.	185697.	156.	3.	36.	13717.	185733.
2003	3056.	14469.	200166.	165.	3.	39.	14472.	200205.

TABLE 40
LATTAKIA TO ARIHA - PRESENT PRACTICES
JISR ESH SHUGUR BYPASS
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=19.25) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	320.	2248.	2248.	11.	0.	0.	2248.	2248.
1979	349.	2453.	4701.	12.	0.	0.	2453.	4701.
1980	381.	2676.	7378.	13.	0.	1.	2676.	7378.
1981	416.	2920.	10297.	14.	0.	1.	2920.	10298.
1982	453.	3185.	13483.	16.	0.	1.	3185.	13484.
1983	495.	3475.	16958.	17.	0.	2.	3475.	16959.
1984	529.	3715.	20673.	18.	0.	2.	3715.	20675.
1985	565.	3971.	24645.	20.	0.	2.	3971.	24647.
1986	604.	4246.	28890.	22.	0.	3.	4245.	28892.
1987	646.	4538.	33429.	23.	0.	3.	4538.	33431.
1988	690.	4852.	38280.	25.	0.	3.	4852.	38283.
1989	738.	5186.	43467.	27.	0.	4.	5186.	43470.
1990	789.	5544.	49011.	29.	1.	5.	5544.	49015.
1991	844.	5927.	54938.	32.	1.	5.	5927.	54942.
1992	902.	6336.	61274.	34.	1.	6.	6336.	61279.
1993	964.	6773.	68046.	37.	1.	6.	6773.	68052.
1994	1017.	7145.	75192.	39.	1.	7.	7146.	75198.
1995	1073.	7538.	82730.	42.	1.	8.	7539.	82738.
1996	1132.	7953.	90683.	44.	1.	9.	7953.	90691.
1997	1194.	8390.	99074.	47.	1.	10.	8391.	99083.
1998	1260.	8852.	107926.	50.	1.	10.	8852.	107936.
1999	1329.	9339.	117264.	53.	1.	11.	9339.	117275.
2000	1402.	9852.	127117.	56.	1.	12.	9853.	127129.
2001	1479.	10394.	137511.	60.	1.	14.	10395.	137524.
2002	1561.	10966.	148477.	63.	1.	15.	10967.	148491.
2003	1647.	11569.	160046.	67.	1.	16.	11570.	160061.

TABLE 41
LATTAKIA TO ARIHA - PRESENT PRACTICES
JISR ESH SHUGUR BYPASS
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 5.64) VOLUME	ANNUAL EAL	CUMUL. EAL	BUS (F=0.05) VOLUME	ANNUAL EAL	CUMUL. EAL	TRUCK + BUS ANNUAL EAL	CUMUL. EAL
1978	274.	564.	564.	16.	0.	0.	564.	564.
1979	299.	615.	1179.	17.	0.	1.	615.	1180.
1980	325.	671.	1851.	19.	0.	1.	671.	1851.
1981	356.	732.	2583.	21.	0.	1.	732.	2584.
1982	388.	799.	3382.	23.	0.	2.	799.	3384.
1983	424.	872.	4254.	25.	0.	2.	872.	4256.
1984	453.	932.	5186.	27.	0.	3.	932.	5189.
1985	484.	996.	6183.	29.	1.	3.	996.	6185.
1986	517.	1065.	7248.	31.	1.	4.	1065.	7251.
1987	553.	1139.	8386.	34.	1.	4.	1139.	8390.
1988	591.	1217.	9603.	37.	1.	5.	1217.	9608.
1989	632.	1301.	10905.	40.	1.	6.	1301.	10910.
1990	676.	1391.	12295.	43.	1.	7.	1391.	12301.
1991	722.	1487.	13782.	46.	1.	7.	1487.	13789.
1992	772.	1589.	15372.	50.	1.	8.	1590.	15380.
1993	825.	1699.	17071.	54.	1.	9.	1700.	17080.
1994	871.	1793.	18863.	57.	1.	10.	1793.	18873.
1995	919.	1891.	20755.	61.	1.	12.	1892.	20766.
1996	969.	1995.	22750.	65.	1.	13.	1996.	22762.
1997	1022.	2105.	24855.	69.	1.	14.	2106.	24868.
1998	1079.	2221.	27075.	73.	1.	15.	2222.	27090.
1999	1138.	2343.	29418.	77.	1.	17.	2344.	29434.
2000	1201.	2472.	31890.	82.	1.	18.	2473.	31907.
2001	1267.	2608.	34497.	87.	2.	20.	2609.	34517.
2002	1336.	2751.	37248.	92.	2.	21.	2752.	37269.
2003	1410.	2902.	40151.	98.	2.	23.	2904.	40173.

TABLE 42
LATTAKIA TO ARIHA - PRESENT PRACTICES
JISR ESH SHUGUR TO ARIHA
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=12.55) VOLUME	ANNUAL EAL	CUMUL. EAL	BUS (F=0.05) VOLUME	ANNUAL EAL	CUMUL. EAL	TRUCK + BUS ANNUAL EAL	CUMUL. EAL
1978	708.	3243.	3243.	120.	2.	2.	3245.	3245.
1979	772.	3538.	6781.	131.	2.	5.	3540.	6786.
1980	843.	3860.	10642.	143.	3.	7.	3862.	10648.
1981	919.	4212.	14853.	156.	3.	10.	4214.	14863.
1982	1003.	4595.	19448.	171.	3.	13.	4597.	19461.
1983	1094.	5013.	24461.	186.	3.	17.	5016.	24477.
1984	1170.	5359.	29820.	201.	4.	20.	5362.	29840.
1985	1251.	5729.	35549.	218.	4.	24.	5732.	35572.
1986	1337.	6124.	41672.	235.	4.	29.	6128.	41700.
1987	1429.	6546.	48219.	254.	5.	33.	6551.	48252.
1988	1528.	6998.	55217.	275.	5.	38.	7003.	55255.
1989	1633.	7481.	62698.	297.	5.	44.	7486.	62741.
1990	1746.	7997.	70695.	321.	6.	49.	8003.	70744.
1991	1866.	8549.	79244.	347.	6.	56.	8555.	79299.
1992	1995.	9139.	88383.	376.	7.	63.	9145.	88445.
1993	2133.	9769.	98153.	406.	7.	70.	9776.	98222.
1994	2250.	10307.	108459.	431.	8.	78.	10314.	108537.
1995	2374.	10874.	119333.	457.	8.	86.	10881.	119419.
1996	2504.	11472.	130805.	485.	9.	95.	11480.	130899.
1997	2642.	12103.	142907.	515.	9.	105.	12112.	143011.
1998	2787.	12768.	155676.	546.	10.	114.	12778.	155790.
1999	2941.	13471.	169146.	579.	11.	125.	13481.	169271.
2000	3102.	14211.	183358.	615.	11.	136.	14222.	183493.
2001	3273.	14993.	198351.	652.	12.	148.	15004.	198498.
2002	3453.	15818.	214168.	692.	13.	161.	15830.	214329.
2003	3643.	16688.	230856.	734.	13.	174.	16701.	231030.

TABLE 43
LATTAKIA TO ARIHA - PRESENT PRACTICES
JISR ESH SHUGUR TO ARIHA
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=19.26) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	360.	2531.	2531.	64.	1.	1.	2531.	2531.
1979	393.	2761.	5292.	70.	1.	2.	2762.	5294.
1980	429.	3012.	8304.	76.	1.	4.	3013.	8307.
1981	467.	3286.	11591.	83.	2.	5.	3287.	11595.
1982	510.	3586.	15176.	91.	2.	7.	3587.	15183.
1983	556.	3912.	19088.	99.	2.	9.	3913.	19096.
1984	595.	4182.	23270.	107.	2.	11.	4183.	23280.
1985	636.	4470.	27740.	116.	2.	13.	4472.	27752.
1986	680.	4779.	32519.	126.	2.	15.	4780.	32533.
1987	727.	5108.	37627.	136.	2.	18.	5110.	37644.
1988	777.	5461.	43088.	147.	3.	20.	5463.	43108.
1989	830.	5836.	48926.	159.	3.	23.	5840.	48948.
1990	888.	6240.	55166.	171.	3.	26.	6243.	55192.
1991	949.	6671.	61837.	185.	3.	30.	6674.	61866.
1992	1014.	7131.	68969.	200.	4.	33.	7135.	69001.
1993	1084.	7623.	76592.	217.	4.	37.	7627.	76629.
1994	1144.	8043.	84635.	230.	4.	42.	8046.	84676.
1995	1207.	8485.	93120.	244.	4.	46.	8489.	93165.
1996	1273.	8952.	102072.	259.	5.	51.	8956.	102122.
1997	1343.	9444.	111516.	274.	5.	56.	9449.	111571.
1998	1417.	9964.	121479.	291.	5.	61.	9968.	121540.
1999	1495.	10512.	131991.	309.	6.	67.	10517.	132057.
2000	1578.	11090.	143081.	328.	6.	73.	11095.	143153.
2001	1664.	11700.	154780.	348.	6.	79.	11705.	154859.
2002	1756.	12343.	167123.	369.	7.	86.	[illegible]	167209.
2003	1852.	13022.	180145.	391.	7.	93.	13029.	180238.

TABLE 44
LATTAKIA TO ARIHA - PRESENT PRACTICES
JISR ESH SHUGUR TO ARIHA
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	9.10	6.90	5.50
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 5.61) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	348.	713.	713.	56.	1.	1.	713.	713.
1979	380.	777.	1490.	61.	1.	2.	778.	1492.
1980	414.	846.	2338.	67.	1.	3.	849.	2341.
1981	452.	925.	3264.	73.	1.	5.	926.	3266.
1982	493.	1010.	4273.	80.	1.	6.	1011.	4279.
1983	538.	1101.	5375.	87.	2.	8.	1103.	5382.
1984	575.	1177.	6552.	94.	2.	9.	1179.	6561.
1985	615.	1259.	7811.	102.	2.	11.	1260.	7821.
1986	657.	1346.	9156.	110.	2.	13.	1347.	9169.
1987	702.	1438.	10595.	119.	2.	15.	1440.	10610.
1988	751.	1536.	12132.	128.	2.	18.	1539.	12149.
1989	803.	1644.	13776.	139.	3.	20.	1646.	13796.
1990	856.	1757.	15533.	150.	3.	23.	1759.	15556.
1991	917.	1878.	17411.	162.	3.	26.	1881.	17437.
1992	981.	2008.	19419.	175.	3.	29.	2011.	19448.
1993	1048.	2147.	21566.	189.	3.	33.	2149.	21598.
1994	1106.	2265.	23830.	201.	4.	36.	2268.	23866.
1995	1167.	2389.	26220.	213.	4.	40.	2393.	26259.
1996	1231.	2521.	28740.	226.	4.	44.	2524.	28784.
1997	1299.	2659.	31399.	240.	4.	49.	2663.	31448.
1998	1370.	2805.	34205.	255.	5.	53.	2810.	34258.
1999	1445.	2960.	37164.	270.	5.	58.	2964.	37222.
2000	1525.	3123.	40287.	287.	5.	64.	3127.	40350.
2001	1609.	3294.	43581.	304.	5.	69.	3299.	43650.
2002	1697.	3475.	47057.	323.	6.	75.	3481.	47131.
2003	1791.	3667.	50723.	343.	6.	81.	3672.	50804.

TABLE 45

LEGAL LOADING

WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Lattakia to Haffe/Slenfe Road Junction

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire	82.4					
empty		0.11	11.7	0.01	71.7	0.06
loaded		4.31	88.3	3.14	28.3	1.01
3 axle, 10 tire	3.8					
empty		0.12	12.5	2/	61.5	2/
loaded		1.82	87.5	0.06	38.5	0.03
COMBINATION VEHICLES						
Tractor + ½ Trailer 1/ (2 axles + 2 axles)	1.4					
empty		0.11	5.1	2/	79.8	2/
loaded		1.20	94.9	0.02	20.2	2/
Tractor + ½ Trailer 1/ (3 axles + 2 axles)	12.4					
empty		0.06	5.1	2/	79.8	0.01
loaded		2.03	94.9	0.24	20.2	0.05
TOTAL	100.0	-	-	3.47	-	1.16

1/ Assumed 90 percent 5 axle combinations.

2/ Less than 0.01.

TABLE 46

LEGAL LOADING

WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Haffe/Slenfe Road Junction to Jisr Esh Shugur

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire	81.7					
empty		0.11	11.7	0.01	71.7	0.06
loaded		4.31	88.3	3.11	28.3	1.00
3 axle, 10 tire	3.1					
empty		0.12	12.5	2/	61.5	2/
loaded		1.82	87.5	0.05	38.5	0.02
COMBINATION VEHICLES						
Tractor + ½ Trailer 1/ (2 axles + 2 axles)	1.5					
empty		0.11	5.1	2/	79.8	2/
loaded		1.20	94.9	0.02	20.2	2/
Tractor + ½ Trailer 1/ (3 axles + 2 axles)	13.7					
empty		0.06	5.1	2/	79.8	0.01
loaded		2.03	94.9	0.26	20.2	0.06
TOTAL	100.0	-	-	3.45	-	1.15

1/ Assumed 90 percent 5 axle combinations.

2/ Less than 0.01.

TABLE 47

LEGAL LOADING

WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Jisr Esh Shugur Bypass

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire	80.8					
empty		0.11	11.7	0.01	71.7	0.06
loaded		4.31	88.3	3.08	28.3	0.99
3 axle, 10 tire	3.2					
empty		0.12	12.5	2/	61.5	2/
loaded		1.82	87.5	0.05	38.5	0.02
COMBINATION VEHICLES						
Tractor + ½ Trailer 1/ (2 axles + 2 axles)	1.6					
empty		0.11	5.1	2/	79.8	2/
loaded		1.20	94.9	0.02	20.2	2/
Tractor + ½ Trailer 1/ (3 axles + 2 axles)	14.4					
empty		0.06	5.1	2/	79.8	0.01
loaded		2.03	94.9	0.28	20.2	0.06
TOTAL	100.0	-	-	3.44	-	1.14

1/ Assumed 90 percent 5 axle combinations.

2/ Less than 0.01.

TABLE 48

LEGAL LOADING

WEIGHTED EQUIVALENT AXLE LOADS

ROAD SECTION: Jisr Esh Shugur to Ariha

VEHICLE TYPE	PERCENT OF TRUCKS	AVERAGE EAL	DIRECTION TO: Ariha PERCENT	DIRECTION TO: Ariha DAILY EAL	DIRECTION TO: Lattakia PERCENT	DIRECTION TO: Lattakia DAILY EAL
SINGLE UNIT VEHICLES						
2 axle, 6 tire	78.2					
empty		0.11	11.7	0.01	71.7	0.06
loaded		4.31	88.3	2.98	28.3	0.95
3 axle, 10 tire	6.4					
empty		0.12	12.5	2/	61.5	2/
loaded		1.82	87.5	0.10	38.5	0.04
COMBINATION VEHICLES						
Tractor + ½ Trailer 1/ (2 axles + 2 axles)	1.5					
empty		0.11	5.1	2/	79.8	2/
loaded		1.20	94.9	0.02	20.2	2/
Tractor + ½ Trailer 1/ (3 axles + 2 axles)	13.9					
empty		0.06	5.1	2/	79.8	0.01
loaded		2.03	94.9	0.27	20.2	0.06
TOTAL	100.0	-	-	3.38	-	1.12

1/ Assumed 90 percent 5 axle combinations.

2/ Less than 0.01.

TABLE 49
LATTAKIA TO ARIHA - LEGAL LOADINGS
LATTAKIA TO HAFFE/SLENFE ROAD JUNCTION
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 2.33) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	1353.	1151.	1151.	206.	4.	4.	1154.	1154.
1979	1467.	1247.	2398.	225.	4.	8.	1251.	2405.
1980	1590.	1352.	3750.	246.	4.	12.	1356.	3762.
1981	1723.	1466.	5216.	268.	5.	17.	1470.	5232.
1982	1868.	1589.	6805.	293.	5.	23.	1594.	6827.
1983	2025.	1722.	8527.	320.	6.	28.	1728.	8555.
1984	2161.	1838.	10364.	346.	6.	35.	1843.	10399.
1985	2306.	1961.	12325.	374.	7.	42.	1967.	12366.
1986	2460.	2092.	14417.	404.	7.	49.	2099.	14466.
1987	2625.	2232.	16650.	437.	8.	57.	2240.	16706.
1988	2801.	2382.	19031.	472.	9.	66.	2390.	19096.
1989	2988.	2541.	21573.	510.	9.	75.	2550.	21647.
1990	3189.	2712.	24285.	552.	10.	85.	2721.	24369.
1991	3402.	2893.	27178.	596.	11.	96.	2904.	27273.
1992	3630.	3087.	30265.	645.	12.	108.	3099.	30372.
1993	3873.	3294.	33559.	697.	13.	120.	3306.	33679.
1994	4075.	3465.	37025.	740.	13.	134.	3478.	37158.
1995	4287.	3646.	40670.	785.	14.	148.	3659.	40818.
1996	4510.	3835.	44505.	832.	15.	163.	3850.	44668.
1997	4744.	4035.	48540.	883.	16.	179.	4050.	48719.
1998	4991.	4244.	52784.	937.	17.	197.	4261.	52980.
1999	5250.	4465.	57250.	994.	18.	215.	4483.	57464.
2000	5523.	4697.	61947.	1055.	19.	234.	4716.	62180.
2001	5811.	4942.	66888.	1119.	20.	254.	4961.	67142.
2002	6113.	5199.	72087.	1188.	22.	276.	5220.	72362.
2003	6431.	5469.	77556.	1260.	23.	299.	5491.	77854.

TABLE 50
LATTAKIA TO ARIHA - LEGAL LOADINGS
LATTAKIA TO HAFFE/SLENFE ROAD JUNCTION
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F=-3.47) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	684.	866.	866.	111.	2.	2.	868.	868.
1979	741.	939.	1805.	121.	2.	4.	941.	1809.
1980	804.	1018.	2823.	132.	2.	7.	1020.	2830.
1981	871.	1103.	3927.	145.	3.	9.	1106.	3936.
1982	944.	1196.	5123.	158.	3.	12.	1199.	5135.
1983	1024.	1297.	6420.	172.	3.	15.	1299.	6435.
1984	1092.	1384.	7803.	186.	3.	19.	1386.	7821.
1985	1166.	1476.	9279.	201.	4.	22.	1479.	9301.
1986	1244.	1575.	10855.	218.	4.	26.	1579.	10880.
1987	1327.	1681.	12535.	235.	4.	31.	1684.	12565.
1988	1416.	1793.	14329.	254.	5.	35.	1797.	14363.
1989	1511.	1913.	16242.	275.	5.	40.	1918.	16282.
1990	1612.	2042.	18284.	297.	5.	46.	2047.	18329.
1991	1720.	2178.	20462.	321.	6.	52.	2184.	20513.
1992	1835.	2324.	22786.	347.	6.	58.	2330.	22844.
1993	1958.	2480.	25266.	376.	7.	65.	2486.	25331.
1994	2060.	2609.	27876.	398.	7.	72.	2616.	27947.
1995	2167.	2745.	30620.	423.	8.	80.	2752.	30700.
1996	2280.	2887.	33508.	449.	8.	88.	2895.	33595.
1997	2398.	3038.	36545.	476.	9.	97.	3046.	36642.
1998	2523.	3196.	39741.	505.	9.	106.	3204.	39846.
1999	2654.	3362.	43103.	536.	10.	116.	3371.	43218.
2000	2792.	3537.	46639.	568.	10.	126.	3546.	46765.
2001	2937.	3720.	50360.	603.	11.	137.	3731.	50496.
2002	3090.	3914.	54274.	640.	12.	149.	3925.	54422.
2003	3251.	4117.	58391.	679.	12.	161.	4129.	58552.

TABLE 51
LATTAKIA TO ARIHA - LEGAL LOADINGS
LATTAKIA TO HAFFE/SLENFE ROAD JUNCTION
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 1.16) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	669.	283.	283.	95.	2.	2.	284.	284.
1979	725.	307.	590.	104.	2.	4.	308.	593.
1980	786.	333.	923.	113.	2.	6.	334.	928.
1981	852.	361.	1284.	124.	2.	8.	363.	1291.
1982	924.	391.	1675.	135.	2.	10.	393.	1685.
1983	1001.	424.	2099.	148.	3.	13.	426.	2112.
1984	1068.	452.	2551.	159.	3.	16.	455.	2567.
1985	1140.	483.	3034.	172.	3.	19.	485.	3053.
1986	1216.	515.	3549.	186.	3.	23.	518.	3571.
1987	1298.	550.	4099.	201.	4.	26.	553.	4124.
1988	1385.	586.	4685.	218.	4.	30.	590.	4715.
1989	1478.	626.	5311.	235.	4.	35.	629.	5345.
1990	1577.	668.	5978.	254.	5.	39.	672.	6017.
1991	1682.	712.	6690.	275.	5.	44.	717.	6734.
1992	1795.	760.	7450.	297.	5.	50.	765.	7499.
1993	1915.	811.	8261.	321.	6.	55.	816.	8316.
1994	2015.	853.	9114.	341.	6.	62.	859.	9175.
1995	2120.	897.	10012.	362.	7.	68.	904.	10079.
1996	2230.	944.	10956.	384.	7.	75.	951.	11031.
1997	2346.	993.	11949.	407.	7.	83.	1000.	12031.
1998	2468.	1045.	12994.	432.	8.	91.	1052.	13084.
1999	2596.	1099.	14093.	459.	8.	99.	1107.	14191.
2000	2731.	1156.	15249.	487.	9.	108.	1165.	15357.
2001	2873.	1216.	16466.	516.	9.	117.	1225.	16583.
2002	3022.	1280.	17745.	548.	10.	127.	1289.	17872.
2003	3180.	1346.	19092.	581.	11.	138.	1356.	19229.

TABLE 52
LATTAKIA TO ARIHA - LEGAL LOADINGS
HAFFE/SLENFE ROAD JUNCTION TO JISR ESH SHUGUR
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 2.34) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	1261.	1077.	1077.	96.	2.	2.	1078.	1078.
1979	1367.	1167.	2245.	105.	2.	4.	1169.	2248.
1980	1482.	1266.	3510.	114.	2.	6.	1267.	3515.
1981	1606.	1372.	4882.	125.	2.	8.	1374.	4889.
1982	1741.	1487.	6369.	137.	2.	11.	1489.	6379.
1983	1887.	1612.	7981.	149.	3.	13.	1614.	7994.
1984	2014.	1720.	9701.	161.	3.	16.	1722.	9717.
1985	2149.	1835.	11536.	174.	3.	19.	1838.	11555.
1986	2293.	1958.	13495.	188.	3.	23.	1961.	13517.
1987	2446.	2089.	15584.	204.	4.	27.	2093.	15610.
1988	2610.	2229.	17813.	220.	4.	31.	2233.	17843.
1989	2785.	2379.	20192.	238.	4.	35.	2383.	20227.
1990	2972.	2538.	22730.	257.	5.	40.	2542.	22769.
1991	3171.	2708.	25439.	278.	5.	45.	2713.	25483.
1992	3383.	2890.	28328.	300.	5.	50.	2895.	28378.
1993	3610.	3083.	31412.	325.	6.	56.	3089.	31467.
1994	3798.	3244.	34655.	345.	6.	62.	3249.	34717.
1995	3995.	3412.	38068.	366.	7.	69.	3418.	38136.
1996	4203.	3590.	41657.	388.	7.	76.	3596.	41733.
1997	4421.	3776.	45434.	412.	8.	84.	3783.	45517.
1998	4651.	3973.	49406.	437.	8.	92.	3980.	49497.
1999	4893.	4179.	53586.	463.	8.	100.	4187.	53685.
2000	5148.	4397.	57982.	492.	9.	109.	4405.	58091.
2001	5415.	4625.	62608.	522.	10.	119.	4634.	62726.
2002	5697.	4866.	67474.	553.	10.	129.	4875.	67602.
2003	5993.	5119.	72592.	587.	11.	139.	5129.	72731.

TABLE 53
LATTAKIA TO ARIHA - LEGAL LOADINGS
HAFFE/SLENFE ROAD JUNCTION TO JISR ESH SHUGUR
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 3.45) VOLUME	ANNUAL EAL	CUMUL. EAL	BUS (F=1.15) VOLUME	ANNUAL EAL	CUMUL. EAL	TRUCK + BUS ANNUAL EAL	CUMUL. EAL
1978	655.	825.	825.	50.	21.	21.	845.	845.
1979	710.	894.	1719.	55.	23.	44.	917.	1762.
1980	770.	969.	2658.	60.	25.	69.	994.	2757.
1981	834.	1051.	3739.	65.	27.	96.	1077.	3834.
1982	904.	1139.	4878.	71.	30.	126.	1168.	5003.
1983	980.	1235.	6112.	78.	33.	159.	1267.	6270.
1984	1046.	1317.	7429.	84.	35.	194.	1352.	7623.
1985	1116.	1405.	8835.	91.	38.	232.	1443.	9066.
1986	1191.	1500.	10334.	98.	41.	273.	1540.	10607.
1987	1271.	1600.	11935.	106.	45.	318.	1644.	12252.
1988	1356.	1707.	13642.	115.	48.	366.	1755.	14007.
1989	1447.	1822.	15464.	124.	52.	418.	1873.	15881.
1990	1544.	1944.	17408.	134.	56.	474.	2000.	17881.
1991	1647.	2074.	19482.	145.	61.	535.	2134.	20016.
1992	1757.	2213.	21695.	157.	66.	600.	2278.	22294.
1993	1875.	2361.	24056.	169.	71.	671.	2432.	24727.
1994	1973.	2484.	26540.	179.	75.	747.	2559.	27286.
1995	2075.	2613.	29153.	190.	80.	827.	2693.	29979.
1996	2183.	2749.	31902.	202.	85.	912.	2833.	32813.
1997	2297.	2892.	34794.	214.	90.	1002.	2982.	35795.
1998	2416.	3042.	37837.	227.	95.	1097.	3137.	38933.
1999	2542.	3201.	41037.	241.	101.	1198.	3301.	42235.
2000	2674.	3367.	44404.	256.	107.	1306.	3474.	45710.
2001	2813.	3542.	47947.	272.	114.	1420.	3656.	49366.
2002	2959.	3726.	51673.	288.	121.	1541.	3847.	53213.
2003	3113.	3920.	55593.	306.	128.	1669.	4048.	57262.

TABLE 54
LATTAKIA TO ARIHA - LEGAL LOADINGS
HAFFE/SLENFE ROAD JUNCTION TO JISR ESH SHUGUR
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 1.15) VOLUME	ANNUAL EAL	CUMUL. EAL	BUS (F=0.05) VOLUME	ANNUAL EAL	CUMUL. EAL	TRUCK + BUS ANNUAL EAL	CUMUL. EAL
1978	606.	254.	254.	46.	1.	1.	255.	255.
1979	657.	276.	530.	50.	1.	2.	276.	531.
1980	712.	299.	829.	55.	1.	3.	299.	831.
1981	772.	324.	1153.	60.	1.	4.	325.	1156.
1982	837.	351.	1504.	65.	1.	5.	352.	1509.
1983	907.	381.	1885.	71.	1.	6.	382.	1891.
1984	968.	406.	2291.	77.	1.	8.	407.	2298.
1985	1033.	433.	2725.	83.	2.	9.	434.	2733.
1986	1102.	462.	3187.	90.	2.	11.	464.	3198.
1987	1176.	493.	3681.	98.	2.	13.	495.	3693.
1988	1254.	527.	4207.	105.	2.	15.	528.	4221.
1989	1338.	562.	4769.	114.	2.	17.	563.	4785.
1990	1428.	599.	5368.	123.	2.	19.	601.	5387.
1991	1524.	640.	6008.	133.	2.	21.	642.	6029.
1992	1626.	682.	6691.	144.	3.	24.	685.	6714.
1993	1735.	728.	7419.	156.	3.	27.	731.	7445.
1994	1825.	766.	8185.	165.	3.	30.	769.	8214.
1995	1920.	806.	8991.	175.	3.	33.	809.	9023.
1996	2020.	848.	9839.	186.	3.	36.	851.	9874.
1997	2125.	892.	10730.	197.	4.	40.	895.	10770.
1998	2235.	938.	11669.	209.	4.	44.	942.	11712.
1999	2352.	987.	12656.	222.	4.	48.	991.	12703.
2000	2474.	1038.	13694.	236.	4.	52.	1042.	13746.
2001	2602.	1092.	14787.	250.	5.	57.	1096.	14843.
2002	2738.	1149.	15936.	265.	5.	62.	1154.	15997.
2003	2880.	1209.	17145.	281.	5.	67.	121[illegible]	17211.

TABLE 55
LATTAKIA TO ARIHA - LEGAL LOADINGS
JISR ESH SHUGUR BYPASS
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 2.38) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	1092.	949.	949.	27.	0.	0.	949.	949.
1979	1184.	1028.	1977.	29.	1.	1.	1028.	1977.
1980	1283.	1115.	3092.	32.	1.	2.	1115.	3093.
1981	1391.	1208.	4300.	35.	1.	2.	1208.	4302.
1982	1508.	1310.	5610.	38.	1.	3.	1310.	5612.
1983	1634.	1420.	7030.	42.	1.	4.	1420.	7033.
1984	1744.	1515.	8545.	45.	1.	5.	1515.	8549.
1985	1861.	1616.	10161.	49.	1.	5.	1617.	10166.
1986	1985.	1725.	11886.	53.	1.	6.	1725.	11892.
1987	2118.	1840.	13726.	57.	1.	7.	1841.	13733.
1988	2260.	1964.	15690.	62.	1.	9.	1964.	15698.
1989	2412.	2095.	17785.	67.	1.	10.	2096.	17794.
1990	2573.	2236.	20021.	72.	1.	11.	2236.	20031.
1991	2746.	2385.	22406.	78.	1.	13.	2385.	22418.
1992	2930.	2545.	24951.	85.	2.	14.	2546.	24965.
1993	3126.	2716.	27667.	91.	2.	16.	2717.	27682.
1994	3289.	2857.	30524.	97.	2.	18.	2858.	30541.
1995	3460.	3005.	33529.	103.	2.	19.	3007.	33548.
1996	3640.	3162.	36691.	109.	2.	21.	3163.	36712.
1997	3829.	3326.	40017.	116.	2.	24.	3328.	40040.
1998	4028.	3499.	43516.	123.	2.	26.	3501.	43542.
1999	4237.	3681.	47197.	130.	2.	28.	3683.	47225.
2000	4458.	3873.	51070.	138.	3.	31.	3875.	51100.
2001	4690.	4074.	55144.	147.	3.	33.	4076.	55177.
2002	4933.	4286.	59430.	156.	3.	36.	4288.	59465.
2003	5190.	4509.	63938.	165.	3.	39.	4511.	63977.

TABLE 56
LATTAKIA TO ARIHA - LEGAL LOADINGS
JISR ESH SHUGUR BYPASS
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 3.44) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	588.	738.	738.	11.	0.	0.	738.	738.
1979	637.	800.	1539.	12.	0.	0.	800.	1539.
1980	691.	868.	2406.	13.	0.	1.	867.	2406.
1981	749.	940.	3347.	14.	0.	1.	940.	3347.
1982	812.	1019.	4366.	16.	0.	1.	1019.	4367.
1983	880.	1105.	5471.	17.	0.	2.	1105.	5472.
1984	939.	1179.	6650.	18.	0.	2.	1179.	6651.
1985	1002.	1258.	7908.	20.	0.	2.	1258.	7910.
1986	1069.	1342.	9250.	22.	0.	3.	1342.	9253.
1987	1141.	1432.	10683.	23.	0.	3.	1432.	10685.
1988	1217.	1528.	12211.	25.	0.	3.	1528.	12214.
1989	1299.	1631.	13842.	27.	0.	4.	1631.	13845.
1990	1386.	1740.	15582.	29.	1.	5.	1740.	15586.
1991	1479.	1856.	17438.	32.	1.	5.	1857.	17443.
1992	1578.	1981.	19419.	34.	1.	6.	1981.	19424.
1993	1683.	2114.	21533.	37.	1.	6.	2114.	21538.
1994	1771.	2223.	23756.	39.	1.	7.	2224.	23763.
1995	1863.	2339.	26095.	42.	1.	8.	2339.	26103.
1996	1960.	2461.	28556.	44.	1.	9.	2461.	28564.
1997	2062.	2589.	31145.	47.	1.	10.	2589.	31154.
1998	2169.	2723.	33868.	50.	1.	10.	2724.	33878.
1999	2282.	2865.	36733.	53.	1.	11.	2865.	36744.
2000	2400.	3014.	39747.	56.	1.	12.	3014.	39759.
2001	2525.	3171.	42917.	60.	1.	14.	3171.	42930.
2002	2656.	3335.	46253.	63.	1.	15.	3336.	46267.
2003	2795.	3509.	49762.	67.	1.	16.	3510.	49777.

TABLE 57
LATTAKIA TO ARIHA - LEGAL LOADINGS
JISR ESH SHUGUR BYPASS
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 1.14) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	504.	210.	210.	16.	0.	0.	210.	210.
1979	546.	227.	437.	17.	0.	1.	227.	437.
1980	592.	246.	683.	19.	0.	1.	246.	684.
1981	642.	267.	951.	21.	0.	1.	267.	951.
1982	696.	290.	1240.	23.	0.	2.	289.	1241.
1983	754.	314.	1554.	25.	0.	2.	314.	1556.
1984	805.	335.	1889.	27.	0.	3.	335.	1891.
1985	859.	357.	2246.	29.	1.	3.	357.	2249.
1986	916.	381.	2628.	31.	1.	4.	381.	2631.
1987	978.	407.	3034.	34.	1.	4.	407.	3038.
1988	1043.	434.	3469.	37.	1.	5.	434.	3473.
1989	1113.	463.	3932.	40.	1.	6.	463.	3937.
1990	1188.	494.	4426.	43.	1.	7.	495.	4432.
1991	1267.	527.	4953.	46.	1.	7.	528.	4960.
1992	1352.	563.	5516.	50.	1.	8.	563.	5524.
1993	1443.	600.	6116.	54.	1.	9.	601.	6125.
1994	1518.	632.	6748.	57.	1.	10.	632.	6758.
1995	1597.	664.	7412.	61.	1.	12.	665.	7423.
1996	1680.	699.	8111.	65.	1.	13.	700.	8124.
1997	1767.	735.	8847.	69.	1.	14.	736.	8860.
1998	1859.	774.	9620.	73.	1.	15.	774.	9635.
1999	1956.	814.	10434.	77.	1.	17.	815.	10450.
2000	2057.	856.	11290.	82.	1.	18.	857.	11308.
2001	2164.	901.	12191.	87.	2.	20.	902.	12210.
2002	2277.	947.	13138.	92.	2.	21.	949.	13159.
2003	2395.	997.	14135.	98.	2.	23.	998.	14158.

TABLE 58
LATTAKIA TO ARIHA - LEGAL LOADINGS
JISR ESH SHUGUR TO ARIHA
BOTH DIRECTIONS
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 2.27) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	1302.	1079.	1079.	120.	2.	2.	1080.	1080.
1979	1411.	1169.	2248.	131.	2.	5.	1171.	2252.
1980	1530.	1268.	3516.	143.	3.	7.	1270.	3522.
1981	1658.	1374.	4890.	156.	3.	10.	1376.	4899.
1982	1795.	1490.	6379.	171.	3.	[illegible]	1492.	6392.
1983	1949.	1615.	7994.	186.	3.	17.	1618.	8010.
1984	2079.	1723.	9717.	201.	4.	20.	1726.	9737.
1985	2219.	1838.	11555.	215.	4.	24.	1842.	11579.
1986	2367.	1961.	13517.	235.	4.	29.	1965.	13545.
1987	2526.	2093.	15609.	254.	5.	33.	2097.	15642.
1988	2695.	2233.	17842.	275.	5.	38.	2238.	17880.
1989	2876.	2383.	20225.	297.	5.	44.	2388.	20268.
1990	3068.	2542.	22767.	321.	6.	49.	2548.	22816.
1991	3274.	2713.	25480.	347.	6.	56.	2718.	25535.
1992	3493.	2894.	28374.	376.	7.	63.	2901.	28437.
1993	3727.	3088.	31463.	406.	7.	70.	3095.	31532.
1994	3921.	3249.	34712.	431.	8.	78.	3256.	34769.
1995	4125.	3418.	38129.	457.	8.	86.	3426.	38215.
1996	4340.	3596.	41725.	485.	9.	95.	3604.	41820.
1997	4565.	3783.	45508.	515.	9.	105.	3791.	45612.
1998	4803.	3979.	49487.	546.	10.	114.	3989.	49601.
1999	5052.	4186.	53673.	579.	11.	125.	4196.	53797.
2000	5315.	4404.	58077.	615.	11.	136.	4415.	58213.
2001	5591.	4633.	62710.	652.	12.	148.	4644.	62857.
2002	5882.	4874.	67583.	692.	13.	161.	4886.	67744.
2003	6188.	5127.	72710.	734.	13.	174.	5140.	72884.

TABLE 59
LATTAKIA TO ARIHA - LEGAL LOADINGS
JISR ESH SHUGUR TO ARIHA
EASTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 3.38) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	662.	817.	817.	64.	1.	1.	817.	817.
1979	718.	885.	1702.	70.	1.	2.	886.	1704.
1980	778.	960.	2662.	76.	1.	4.	961.	2665.
1981	843.	1040.	3702.	83.	2.	5.	1041.	3707.
1982	914.	1128.	4830.	91.	2.	7.	1129.	4836.
1983	991.	1222.	6052.	99.	2.	9.	1224.	6060.
1984	1057.	1304.	7356.	107.	2.	11.	1306.	7367.
1985	1128.	1392.	8748.	116.	2.	13.	1393.	8760.
1986	1204.	1485.	10233.	126.	2.	15.	1487.	10248.
1987	1284.	1584.	11817.	136.	2.	18.	1586.	11835.
1988	1370.	1691.	13508.	147.	3.	20.	1693.	13528.
1989	1462.	1804.	15312.	159.	3.	23.	1806.	15335.
1990	1560.	1925.	17237.	171.	3.	26.	1927.	17262.
1991	1665.	2054.	19290.	185.	3.	30.	2057.	19319.
1992	1776.	2191.	21481.	200.	4.	33.	2194.	21514.
1993	1895.	2338.	23820.	217.	4.	37.	2342.	23856.
1994	1994.	2460.	26279.	230.	4.	42.	2463.	26320.
1995	2097.	2588.	28867.	244.	4.	46.	2592.	28912.
1996	2206.	2722.	31589.	259.	5.	51.	2726.	31639.
1997	2321.	2864.	34453.	274.	5.	56.	2868.	34508.
1998	2442.	3013.	37465.	291.	5.	61.	3017.	37526.
1999	2569.	3169.	40634.	309.	6.	67.	3174.	40701.
2000	2702.	3334.	43968.	328.	6.	73.	3340.	44041.
2001	2843.	3507.	47476.	348.	6.	79.	3513.	47554.
2002	2991.	3690.	51166.	369.	7.	86.	3696.	51251.
2003	3146.	3882.	55047.	391.	7.	93.	3888.	55140.

TABLE 60
LATTAKIA TO ARIHA - LEGAL LOADINGS
JISR ESH SHUGUR TO ARIHA
WESTBOUND
EQUIVALENT AXLE LOADS (EAL)
(EAL TOTALS IN THOUSANDS)

GROWTH RATES

	1978-83	1983-93	1993-2003
TRUCK	8.40	6.70	5.20
BUS	9.20	8.10	6.10

YEAR	TRUCK (F= 1.12) VOLUME	TRUCK ANNUAL EAL	TRUCK CUMUL. EAL	BUS (F=0.05) VOLUME	BUS ANNUAL EAL	BUS CUMUL. EAL	TRUCK + BUS ANNUAL EAL	TRUCK + BUS CUMUL. EAL
1978	640.	262.	262.	56.	1.	1.	262.	262.
1979	694.	284.	545.	61.	1.	2.	284.	547.
1980	752.	307.	853.	67.	1.	3.	308.	856.
1981	815.	333.	1186.	73.	1.	5.	334.	1190.
1982	884.	361.	1547.	80.	1.	6.	362.	1553.
1983	958.	392.	1939.	87.	2.	8.	393.	1946.
1984	1022.	418.	2357.	94.	2.	9.	419.	2366.
1985	1091.	446.	2802.	102.	2.	11.	447.	2813.
1986	1164.	476.	3278.	110.	2.	13.	477.	3291.
1987	1242.	508.	3786.	119.	2.	15.	509.	3801.
1988	1325.	542.	4327.	128.	2.	18.	543.	4345.
1989	1414.	578.	4905.	139.	3.	20.	580.	4925.
1990	1508.	617.	5522.	150.	3.	23.	619.	5544.
1991	1609.	658.	6180.	162.	3.	26.	660.	6205.
1992	1717.	702.	6882.	175.	3.	29.	705.	6910.
1993	1832.	749.	7631.	189.	3.	33.	752.	7663.
1994	1927.	788.	8419.	201.	4.	36.	791.	8454.
1995	2028.	829.	9247.	213.	4.	40.	832.	9287.
1996	2133.	872.	10119.	226.	4.	44.	876.	10163.
1997	2244.	917.	11037.	240.	4.	49.	921.	11085.
1998	2361.	965.	12002.	255.	5.	53.	969.	12055.
1999	2484.	1015.	13017.	270.	5.	58.	1020.	13075.
2000	2613.	1068.	14085.	287.	5.	64.	1073.	14148.
2001	2749.	1124.	15209.	304.	6.	69.	1129.	15277.
2002	2891.	1182.	16391.	323.	6.	75.	1187.	16465.
2003	3042.	1243.	17634.	343.	6.	81.	1249.	17715.