App 5N, Ch 5, HB 3
(TM 3:26) 8-3-78

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) — PART I

Report Symbol U-4

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
Ma'an - Quweira Highway, 278-0187	278-J-012, (Loan)	USAID/Jordan

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each F.Y.) 81-2

☒ Terminal EVALUATION ☐ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING		7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent	B. Final Obligation Expected	C. Final Input Delivery	A. Total	$14,205,000+	From (month/yr.) April 1975
FY 75	FY 75	FY 81	B. U.S.	$10,000,000	To (month/yr.) March 1981
					Date of Evaluation Review March-April 1981

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE. Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Continue to promote and support Jordanian initiatives to review and revise overall contracting practices and procedures as well as contract management.	USAID Staff	Continuing
2. Continue to encourage effective implementation of laws regulating highway use for reasons of safety and proper operation and maintenance.	USAID Staff	Continuing
3. Continue to monitor progress being made on repairing those segments of the highway which have seriously deteriorated.	USAID Staff	Continuing
4. Investigate with AID/W the appropriateness of 15% withheld from GOJ claims for depreciation. Based on response determine need for extending TDD.	USAID Staff	May 11,1981 (Amman 3,694
5. USAID Director and Capital Resources Development Officer to discuss with GOJ road maintenance and axle load issues pertinent to the Loan Agreement's special covenant on establishment of the weighing station.	USAID Staff	May 31, 1981

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☐ Financial Plan
- ☐ Logical Framework
- ☐ Project Agreement
- ☐ Implementation Plan e.g., CPI Network
- ☐ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☐ Continue Project Without Change
- B. ☐ Change Project Design and/or ☐ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Royal R. Cline
Royal Cline, Engineer

12. Mission/AID/W Office Director Approval

Signature: Edgar C. Harrell

Typed Name: Edgar C. Harrell

Date: May 23, 1981

BEST AVAILABLE COPY

MA'AN - QUWEIRA HIGHWAY

Project Facts

Owner: Government of Jordan represented by the Ministry of Public Works.

Engineer: Dar Al-Handasah (Shair & Partners)

Contractor: Shahin Engineering and Contracting Company.

Date of Tender:	April 21, 1975
Contract Awarded:	July 14, 1975
Contract signed:	July 21, 1975
Construction time:	900 calender days (as per contract)
Notice to Proceed:	August 7, 1975
Amount of the Loan:	$ 10,000,000
Amount Disbursed to date:	$ 9,419,275

USAID/Jordan Committee Clearances:	Initial	Date
Abdallah Ahmad, CD/E	HA	4/19/81
Rex Cline, CD/E	RLC	4/19/81
Larry Brown, CD/E	LB	4/19/81
Albert Karian, CD/E	[illegible]	4/19/81
Jarir Dajani, Evaluation Specialist	[illegible]	4/20/81

1. Project Purpose and Goals

The purpose of this highway is to reduce the social and economic costs of road transportation between the southern city of Aqaba, the only seaport in the country, and the population centers of Jordan which are located in the north. Such reduced costs were to be indicated by reductions of vehicle transit time, vehicle operation and maintenance costs and improved road safety conditions.

For achieving this purpose, it was assumed that the road would be properly maintained and would be utilized in accordance with design criteria relating to such factors as vehicle weight, load and speed.

The goals to which the project is expected to contribute are: (1) more efficient and less costly availability of imported goods on the market, and (2) more efficient and more profitable export operations. The accomplishment of these goals is expected to occur as a result of a more timely delivery of goods and transportation of people, increased volume of traffic, reduced costs to the purchasers of imported goods, and a better competitive position for exporters.

For the achievement of these goals, it was assumed that (a) the road between Aqaba and the population centers would be properly maintained and utilized, (b) markets would be favorable and the goods would be available for import and export, (c) the Jordanian economy would continue to grow and to support trade, and (d) reduced transportation costs would be reflected in prices of goods in the market and in increased exports.

2. Project Description

The project consists of the construction of 73.65 Kms of new highway from the township of Ma'an to the junction of the Amman-Aqaba road and the road to the Village of Rum. This junction is about 8 Kms south of the Village of Quweira (See Figure 1). This highway replaces a 75.7 Km road which was constructed in 1963. The following paragraphs provide a description of both the old and new roads. Table 1 provides a comparative summary of the two roads.

2.1 Description of Old Road

The 75.7 kms of old road between Ma'an and the junction with the road to Rum is described, in three sections, as it was prior to this project, as follows:

a. From Ma'an to Ras En-Naqb, a distance of 35.7 Kms, the road rises from 1,200 meters to about 1,550 meters. Surface condition of this section was fair, but the alignment and gradient were less so. Horizontal curvatures with radii in the 200 to 600 meter range were often encountered and grades frequently exceeded 5 percent, and, in some places, increased to 7 percent.

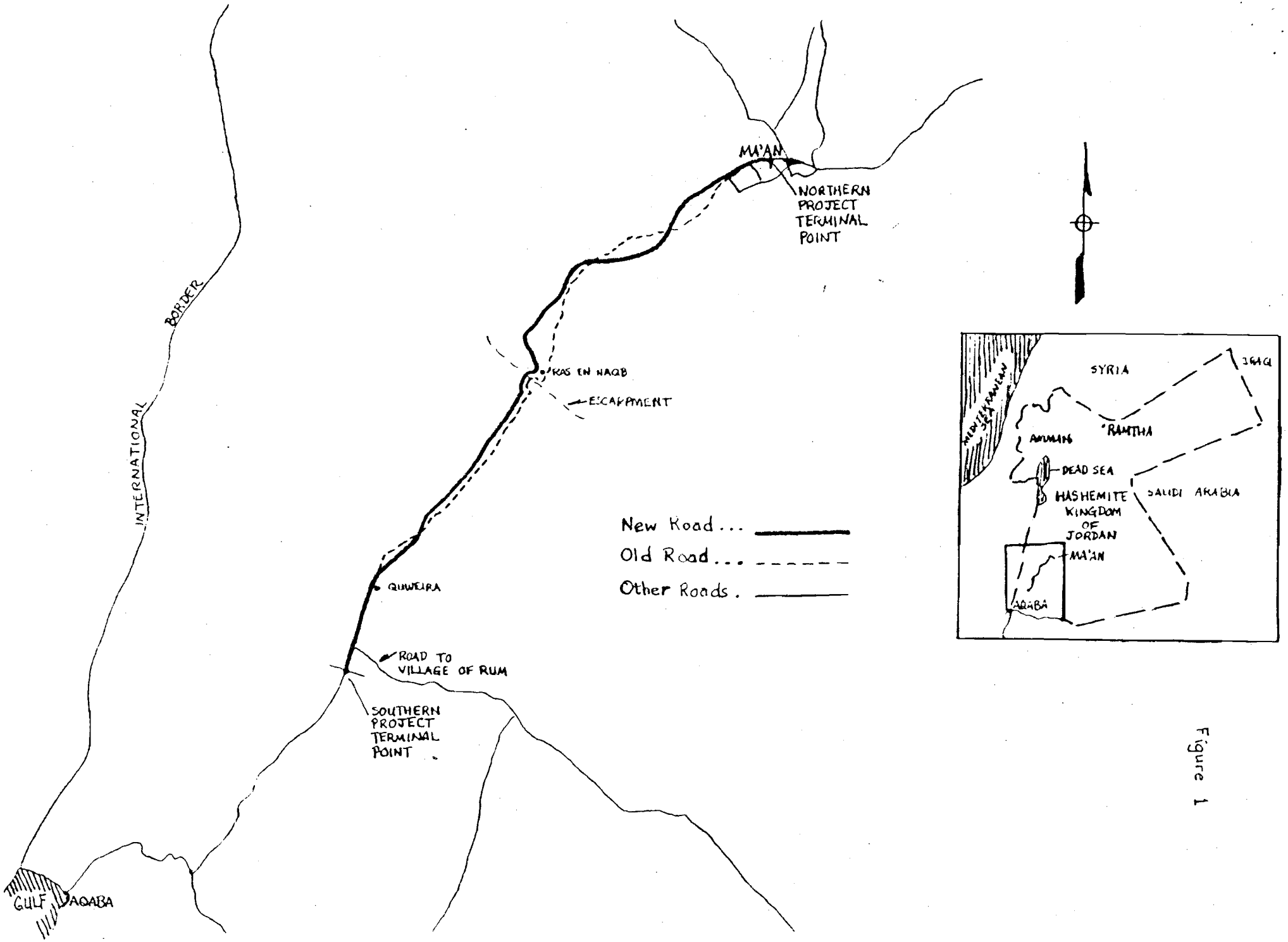

MA'AN
NORTHERN PROJECT TERMINAL POINT
RAS EN NAQB
ESCARPMENT
QUWEIRA
ROAD TO VILLAGE OF RUM
SOUTHERN PROJECT TERMINAL POINT
INTERNATIONAL BORDER
GULF OF AQABA
New Road...
Old Road...
Other Roads.
SYRIA
IRAQ
MEDITERRANEAN SEA
AMMAN
RAMTHA
DEAD SEA
HASHEMITE KINGDOM OF JORDAN
SAUDI ARABIA
MA'AN
AQABA

Figure 1

b. From Ras En-Naqb towards Quweira (11 kilometers), the road descended from an elevation of 1,550 meters to 1,240 meters. On the crossing of this escarpment there were a series of curves with radii between 25 and 200 meters with the largest number of curves falling in the tighter (25 meter) range. Grades averaged about 6 percent rising to 9 percent in some places. Pavement quality in this section was fair.

c. Emerging from the base of the Ras En-Naqb escarpment, the road continued to descend for 29 kilometers to an elevation of about 765 meters passing through Quweira to the junction of the road to Rum. The alignment of this section of the road was good; curve radii ranged from 1,500 to 3,000 meters. Grades were slight and only rarely exceeded 2 percent. The road surface was very poor and was breaking up particularly in the wind blown areas where the road surface was frequently covered with sand.

Overall, the width of the road varied from 6 to 8 meters. The pavement over the entire 75.7 Kms was failing and drainage (culverts) needed improvement.

2.2 Description of New Road

The alignment of the new highway reduces the distance from Ma'an to the junction to Rum by 2.05 kilometers. The realignment allows an increase in radii of horizontal curvature, improvement in grades and has a design speed of 100 kilometers per hour except for the escarpment crossing where the design speed is 80 kilometers per hour. The design provided for "flexible pavement" with a 7.2 meter wide bituminous wearing surface placed on a sub-base 13.2 meters in width to provide a 3.0 meter shoulder on each side of the wearing surface. Where grades exceeded 6.0 percent, the roadway was widened to 10.5 meters to provide a climbing lane for slower traffic. Design was based on the Jordanian Ministry of Public Works "Standard Specifications for Constructions of Roads and Bridges". This "standard" is based primarily on the American Association of State Highway Officials (AASHO) standard. The roadway was designed for "medium duty" and the structures designed for AASHO H-20-S16-44 loading; normal loading for tractor trailer having a total weight of 36 tons. Design specifications related to safety are factored into these standards.

For those three sections traversed by the highway as described above, the following are the main improvements:

a. From Ma'an to the escarpment (i.e. Ras En-Naqb), the minimum radius of curves has been increased to 1,000 meters and the maximum grade reduced to 5.34 percent with the average grade between 3 and 5 percent.

b. From the top edge of the escarpment, for approximately 12 Kms, the maximum grade is reduced to 6.5 percent with the average grade between 4 and 6 percent. Minimum radius of curves has been increased to 200 meters with the radii of most curves well in excess of 200 meters.

c. The remainder of the road has been designed with rather long tangent sections with the radius of the curves being 2,000 meters or larger. The grades are gentle except for about 3 kilometers near the base of the escarpment where the grade is about 4 percent.

3. Project Implementation

Prior to loan authorization in June 1975, the GOJ had advertised for, and had received, bids from a number of construction contractors. AID personnel examined the Ministry of Public Works award procedures and subsequently approved a construction contract with a Jordanian contractor, the Shahin Engineering and Contracting Company, which was signed on July 21, 1975. Notice to proceed was issued to the contractor on August 7, 1975. The contract period was 900 days and the consultant was instructed by MPW to issue a completion certificate to the contractor on February 10, 1980. Total project duration was then 1,645 days. The project was considered completed on that day although some minor items were still under construction. These included the construction of French drains, paved ditches, cut ditches, guardrails and the repair of damaged sections of the pavement. At this time (March, 1981), construction is considered to be virtually complete, with the exception of the installation of expansion joints on bridges, correction of some sideslopes, and the repair of sections of defective pavement.

Delays in construction (745 day overrun) can be attributed to the following:

a. Congestion at the Port of Aqaba delayed the arrival of some of the contractor's construction equipment, materials, and machinery. Lacking such equipment and materials, the contractor could not keep up with the scheduled rate of progress. A slow start and an unsystematic mobilization effort affected adversely the overall progress. This problem caused delay of the project completion date.

b. Insufficient supply of asphalt by the Jordan Refinery. During the last five years, the country experienced an uprecedented developmental effort. Jordan's refinery could not efficiently supply the required asphalt to all such development projects. The contractor of the Ma'an-Quweira Highway experienced difficulties in obtaining the needed asphalt in a timely fashion. The construction schedule was interrupted several times by the unavailability of this material basic to road construction.

c. Escalation of Costs. The costs of fuel and cement, steel, and other construction materials almost doubled between 1975 and 1980. Labor shortages and steep increases in wages also occurred during that period largely as a result of the high demand for labor in the neighboring oil states. The contract did not allow for price escalation and apparently the contractor did not forsee such large increases in cost.

d. Excavation problems. The Bid Documents and Contract terms and conditions placed the responsibility for determining soil strata information on the bidders. The consultant provided bore hole data only to a depth of two meters which was useful for design purposes.

TABLE 1
Comparison of the Two Roads

Particulars	Old Road	New Road
Length in kilometers	75.70	73.65
Width in meters	6.0-8	7.2-10.5
Shoulder width in meters	0-1.0	3.0
GRADES		
1. Grades for Ma'an-Ras En-Naqb escarpment section	5.0-7.0%	a) Max. grade = 5.3% b) Average grade=between 3.0 & 5.0%
2. Grades for the Ras En-Naqb escarpment section	a) Max grade = 9% b) Average grade =6%	a) Max grade = 6.5% b) Average grade = 4 to 6%
Climbing Lanes	None	It has climbing lane where the grade exceeds 6.0%
3. Grades for the rest of the road	Rarely exceed 2%	a) Gentle grade for 26.6 km. b) Grade is about 4% for 3 km stretch.
CURVATURE		
1. Horizontal curvature radius Ma'an/Ras En-Naqb escarpment section	200-600 meters	Minimum radius is 1000 meters
2. Curvature radii for the Ras En-Naqb escarpment section	a) 25-200 meters b) largest of curves are in the 25 meters range	a) Minimum radius is 200 m b) Largest of curves radii exceed 200 meters.
3. For the rest of the road	1500-3000 meters	2000 meters
DRAINAGE FACILITIES	Less than fair especially in the section between the base of the Ras En-Naqb escarpment and Rum Junction	It has adequate drainage facilities such as: Three bridges, 85 box culverts, 22 metal pipe culverts, 34 concrete pipe culverts. 4,300 cu. m. of French drains, 42,200 sq. m. of paved side ditches, cut ditches, and 1,245 linear meter of dykes.

Particulars	Old Road	New Road
DESIGN SPEED	60 km per hour except for the Ras En-Naqb escarpment (11 km length) where design speed is 40 km per hour.	100km. per hour except for for the Ras En-Naqb escarpment section (11 km) where the design speed is 80 km per hour.
TRAVEL TIME	About 76 minutes	About 46 minutes
SAVING IN THE TIME PER JOURNEY	-	About 30 minutes
MARKING	Is not marked	The central line is marked the entire length with traffic paint.

It has been reported by the contractor that major rock excavation reached 20 meters in depth in the Ras En-Naqb escarpment section. The contractor has claimed that the actual amount of rock cuts substantially exceeded the amount estimated for bid-costing purposes.

e. Contractor's Management. According to the consultant who supervised the construction (viz. Progress Reports No. 31 and 63), the contractor's poor site organization and management resulted in the frequent breakdown of equipment and contributed to the delay of the project.

f. Contractor's rapid business expansion. Shahin Engineering and Contracting Company underwent a rapid expansion in business during the contract period. The company was awarded construction contracts for four other major projects in Jordan subsequent to this contract. This expansion must have stretched the company's available financial and technical resources and rendered difficult the timely completion of these projects.

4. Technical Problems

After the entire road was opened to traffic, pavement and base failure was observed in several sections, totaling about 12 Km lanes. The analysis of the failure of the asphalt pavement revealed pushing, waving and slippage of asphalt in certain stretches and a minor case of alligator cracks over a backfilled culvert. USAID met with the Minister of Public Works and requested repair of the defective sections of the road. The Minister instructed the consultant (Dar Al-Handasah) to investigate the problem and to report to him. The results of the initial investigation were not acceptable to the Minister who instructed the consultant to carry out a more comprehensive investigation of the problem. This investigation is now being conducted.

The Minister of Public Works, however, instructed the contractor to repair the road. The contractor agreed and proceeded accordingly. At the same time, however, Amman streets were being paved and Amman paving contractors were given top priority in obtaining the supply of asphalt which they needed from the Jordan Petroleum Refinery. The contractor of Ma'an-Quweira Highway, thus, had to discontinue the needed repair work. It was not until January 1981, that the contractor was able to continue this work, albeit on a small scale and at a slow pace.

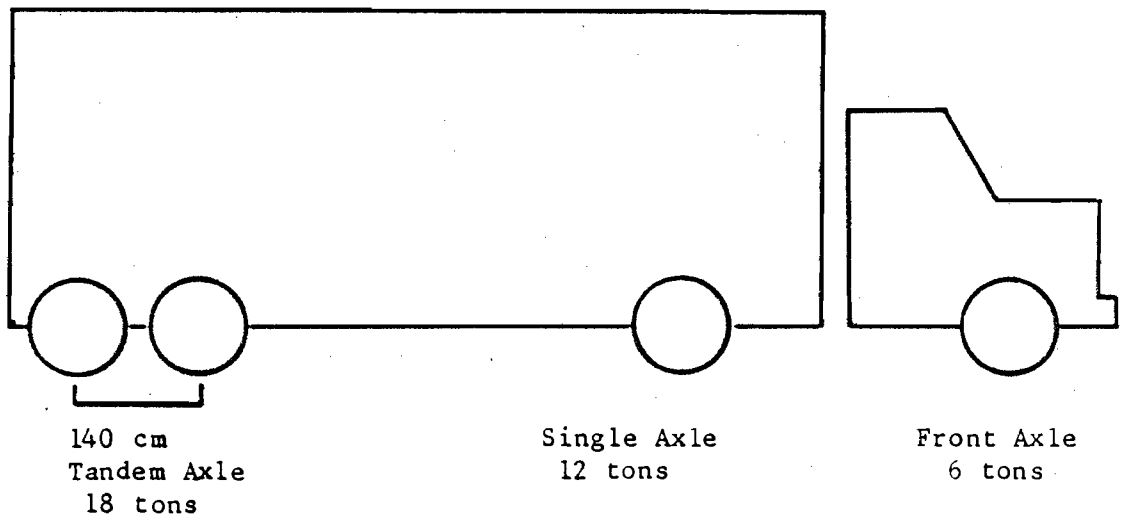
The road failures mentioned above are reported to be partially attributable to the contractor's inadequate technical control. Particularly notable is the reported intermittant failure of the earth moving, compaction and asphalt batching equipment. Another major reason, however, is the use of heavy vehicles with axle loads exceeding those for which the road was designed, and in numbers far in excess of

those originally envisioned. While the former is a problem in traffic control by the GOJ (Government of Jordan), the latter is indicative of project success. These two problems, which are presently being addressed by a study requested by the Minister of Public Works, are discussed in the following two sections.

5. Axle-Loads

The project agreement includes a covenant stating that the GOJ will install at least one weighing station at a location to be determined as a result of discussions with AID. The covenant requires that this weighing station be in place prior to the completion of the project, and be operated continuously thereafter. The weighing station was intended to assure that no vehicles weighing in excess of the "design vehicle" would be allowed to use the road. The "design vehicle" is a normally loaded tractor trailer having a total weight not in excess of 36 tons, with axle loadings as shown in Figure 2.

DESIGN VEHICLE
Figure 2



ALLOWABLE AXLE LOADINGS

The gross overloading of trucks is common and is observed in both the Jordanian road transport system and in international traffic passing through Jordan. This has contributed to an alarming increase in both traffic accidents and road deterioration. The GOJ responded to this problem by drafting a law in 1978 which placed a ceiling on the allowable tonnage per axle. This ceiling was in accordance with the loads shown in Figure 2 above. In addition, the Government has been exploring the possibility of entering into international agreements which would set ceilings for allowable axle loads on trucks originating in other countries.

Although the law had not been enacted yet, the Ministry of Public Works (MPW) and the Ministry of Interior (MOI) started to enforce the new weight limit law on September 1, 1980. To this end, eight portable scales were purchased by the MPW and crews were trained to operate them.

The present penalty is set at JD 5.000 per excess ton. At the request of the GOJ, USAID approved the installation of a permanent weighing station on the Syrian border at Ramtha in order to control the loads on international traffic entering the country at that point. Neither the Ramtha nor the portable scales are presently being effectively used. It is anticipated, however, that enforcement will become effective when the law is enacted.

6. Traffic Volume

The project paper stipulated traffic projections using as a baseline a traffic estimate for 1974 and growth rates of 8 percent and 5 percent per annum for light and heavy traffic, respectively. These growth rates have proven to be underestimates in view of the unprecedented growth which Jordan's economy has experienced in the past six years.

The project paper also assumed that all phosphate rock traffic would be transported by rail to Aqaba by 1978, and that phosphate trucks would cease to operate on the Ma'an-Quweira road. Due to the development of new and expanded mining operations at locations which are not connected to the railway network, phosphate trucks are still operating on the road and are increasing in numbers. The Ministry of Transportation, however, is presently constructing railway lines to connect these new sites to the existing railway line for hauling phosphate to Aqaba. After the completion of these railway lines, perhaps by the end of 1981, all phosphate can be transported by rail.

Table 2 provides a listing of the daily volumes of both light and heavy vehicular traffic on the road as (1) estimated for 1974 in the project paper, (2) counted in 1975 by the Ministry of Public Works, (3) projected for 1978 in the Project Paper, (4) projected for 1980 in the Project Paper and (5) counted in 1979 by the Ministry of Public Works.

The Project Paper estimated light vehicle traffic to increase from 200 vehicles per day (vpd) in 1974 to 274 vpd in 1980. The actual volume in 1979 was 560 vpd, which is 204 percent of the volume forecast for 1980. A similar relationship exists for heavy vehicle traffic which was estimated in 1974 to be 353 vpd and forecast for 1980 to be 458 vpd. Actual 1979 traffic counts indicate a volume of 1352 vpd: 298 percent of the 1980 forecast. Light vehicle traffic has nearly tripled, and heavy vehicle traffic almost quadrupled, during that five year period. This indicates that the actual rates of traffic volume growth during this period were in excess of 20 percent per year, for both types of vehicles.

It is important, for the purposes of the analysis of road-user benefits, to distinguish between Jordanian and Iraqi traffic using the road. This distinction is applied to heavy vehicles only and is based on the proportion of total imports through the Port of Aqaba which is destined for Iraq. Out of a total 2,300,000 tons in 1979, Iraq imported 450,000 tons, or about 19 percent. Thus, about 263 of the 1,352 trucks

TABLE 2
Traffic Analysis

	LIGHT VEHICLES				HEAVY VEHICLES			
Year	Daily Volume (Vehicles per day)	Percent of 1975 Daily Volume	Percent of 1978 Projected Daily Volume	Percent of 1980 Projected Daily Volume	Daily Volumes (Vehicles per day)	Percent of 1975 Daily Volume	Percent of 1978 Projected Daily Volume	Percent of 1980 Projected Daily Volume
1974	200 (Project Paper Estimate)	-	-	-	353 (Project Paper Estimate)	-	-	-
1975	222 (MPW Count)	100	-	-	635 (MPW. Count)	100	-	-
1978	235 (Project Paper Projection)	106	100	-	410 (Project Paper (Projection)	64	100	-
1980	274 (Project Paper Projection)	235	116	100	453 (Project Paper Projection)	71	110	100
1979	560 (MPW Count)	252	238	204	1,352 (MPW Count)	213	329	298

per day, which used the road in 1979, were destined for Iraq. This volume is 50 percent more than that projected for 1978 in the project paper. The proportion of Iraq traffic, however, is only two-thirds of that stipulated in the project paper.

7. Project Benefits

The benefits of the project which accrue to the economy of Jordan include savings in vehicle operating costs, savings in drivers' wages, savings in road accident costs, reductions in vehicles needed, with the concommitant savings in capital costs, and an improvement in Jordan's balance of payments. While the first two benefits can be reasonably estimated, the latter three cannot. No detailed data is available on road accidents, fatalities, and injuries on this particular section of road, i.e., all such statistics are on a national scale. It can be expected, however, that the rate of accidents will decrease as improvements were made in such design features as sight distances, shoulder widths and radii of curvature.

The project paper concluded that the internal rate of return on this road project was 17.4 percent on the basis of the costs and benefits stream for the period 1975-1995. The benefits stream used in the calculation was based on vehicle operation cost savings and savings in commercial vehicle drivers' wages. The following analyses are intended to compare the project designer's expectations for 1980 with benefits which have actually materialized in that year.

a. Savings in Vehicle Operating Costs

Savings in vehicle operating costs result from reduced distances and from improvements in grade, curvature, and road surface.

The cost of operating a light vehicle on a straight, smooth, level road in Jordan in 1974 was estimated to be 12.00 fils per km (6¢/mile) exclusive of taxes. The corresponding cost for heavy vehicles was 29.40 fils per km (15¢/mile). As a result of large increases in gasoline costs and of the general inflationary trend, these costs are estimated to be 26.30 fils/km (19¢/mile) and 70.00 fils/km (35¢/mile) respectively, in 1980.

In order to account for the geometrics of the road and the operating characteristics of the vehicles involved, these unit costs must be appropriately adjusted. This is done by applying a multiplier which reflects the effects of the road and vehicle characteristics on these unit costs. The value of this multiplier is the combination of calculations for different sections of the road weighted by distance. This multiplier was determined to be 1.49 and 2.02 for light and heavy vehicles, respectively, on the old road. The improved design of the new road resulted in a reduction of these factors to 1.12 and 1.30, respectively. The cost of a single trip can thus be obtained as follows:

cost/trip (fils) = Base Unit Cost (fils/km) x multiplier x length.

TABLE 3

SAVINGS IN VEHICLE OPERATING COSTS

(in 1974 Dinars)

	Light Vehicle	Heavy Vehicles
Base Operating Cost (1974)	12.00 fils	29.40 fils
Multiplier-Old Road	1.49	2.02
Multiplier-New Road	1.12	1.30
Saving per trip	JD 0.364	JD. 1.680
Annual Traffic Volume (1979)		
Jordanian	204,400	397,485
Iraqi	-	95,995
Total	204,400	493,480
Annual Savings in Vehicle operating costs	JD 74,400	JD 748,400
Total Annual Savings	JD 822,800	
As estimated in Project Paper	JD 277,200	
Percent Increase in Annual Savings	197%	

The project designers have estimated the 1980 savings to the Jordanian economy in vehicle operating costs to be JD 277,200 (U.S.$865,000) in fixed 1974 Dinars. This calculation is based on the assumption that only 50 percent of the Iraqi-bound traffic is carried in Jordanian vehicles.

Actual savings in 1980, using the same assumptions, amounted to JD 822,800 ($2,570,000) in 1974 Dinars. Considering inflation and the steep rises in fuel costs, these savings amount to JD 1,946,300 ($6,080,000) in 1980 currency. In fixed 1974 Dinars, savings in vehicle operating costs are thus almost three times those stipulated in the project paper.

b. Savings in Drivers' Time

A study of operators' records, which was conducted in 1974, indicated that drivers' wages for commercial vehicles accounted for about 50 percent of commercial vehicle operating costs, exclusive of taxes. Commercial vehicle operating costs for one return trip from Amman to Aqaba at 1980 prices are about JD 70.000. The driver's wages for this trip are thus about JD 35.000, which corresponds to about JD 300 per month. Savings in drivers' wages which result from road improvements can thus be calculated as 50 percent of savings in commercial vehicle operating costs. In 1974 Dinars, the 1979 savings of amounted to JD 333,900 ($1,043,000) for Jordanian traffic and JD 40,300 ($126,000) for Iraq-bound traffic. This total of JD 374,200 ($1,169,000) in 1979 is about three times that estimated in the project paper.

8. Local Socio-Economic Impacts

Both the old and new highways pass through sparsely populated areas. It is thus to be expected that the local socio-economic impacts of the realignment are not significant. The old road passes through the villages of Quweira, Qa'a En-Naqb, Ras En-Naqb, Abu Al-Lasan, and Muraigha. The population of these villages in 1979 was as follows:

POPULATION CENSUS 1979

Name of Village	Population
Quweira	3,457
Ras En-Naqb	829
Abu Al-Lasan	291
Muraigha	431
Qa'a En-Naqb	121

The passage of the road through these villages has contributed to their expansion during the last decade. A small sector of the population of these villages was involved in trade which was dependent on traffic passing through these villages. These trades were a gasoline station,

tire repair shops in Quweira and the sale of certain items needed by truckers, and coffee and snack shops in the smaller villages. The traffic passing through these villages also provided quick and adequate transportation to their residents and gave them a direct connection with other parts of Jordan. The new road alignment shifted away from these villages with the result that their traffic-related services now stand to lose a good portion of their business. Therefore, diseconomies to a certain sector of the local population have resulted from the diversion of the old road.

When the new road came into operation the traffic-dependent businesses of Quweira began to diminish. However, since the location of the new road is not far from the outskirts of the town, new development is expected to take place along the new roadside with people shifting their businesses to a new location and continuing to serve the new and growing traffic.

At Ras En-Naqb, the new road is away from the tourist rest house, leaving the rest house without a clientele. The MPW is planning to construct a two kilometer connector road from the new road to the rest house. Such a connector will help the tourists to stop over for rest and to enjoy the spectacular view below Ras En-Naqb.

The new road passes the tiny settlement of Madares at the escarpment area. The village might expand quickly and benefit from the existence of a road service from which it was previously deprived.

The new road has also facilitated the development of a new experimental farm which is located just north of the Ras En-Naqb escarpment. This farm became possible because of the newly acquired accessibility of the location. Its success may spur a chain of similar farms in a region where agriculture has previously been only of minor significance.

9. Summary

a. Conclusions - It is evident from the above that the project has achieved its purpose of reducing the cost of road transportation between Aqaba and the major urban centers in Jordan and has contributed toward the goals of more efficient import and export operations. Assumptions which were made in the project paper relating to the continuation of growth, the existence of favorable markets and the availability of goods for export and import in Jordan have all proven to be correct. Projections of traffic and trade have not only materialized, but were significantly surpassed during the past few years.

b. Implementation Problems - The problems encountered in the implementation of this project relate to the contractual procedures and the general contracting environment in Jordan during the construction period. The GOJ is well aware of this issue and effective measures are being taken to remedy the situation on a national basis as discussed below.

Contracting procedures, particularly prequalification and bid evaluation procedures, have been the subject of several recent requests for assistance from the Ministry of Public Works (MPW). The MPW has requested USAID to financed technical assistance regarding (1) development of effective prequalification procedures, (2) conduct of a contracting seminar and (3) expenses of GOJ officials attending U.S. seminars on contracting. A USAID financed contracting seminar has been postponed from April 1981 until perhaps June 1981 because of the absence of GOJ officials attending contracting seminars in the U.S. financed by USAID's. It is apparent to USAID that appropriate GOJ authorities are committed to improving the overall contracting procedures of the GOJ.

c. Project Maintenance Problems - Ineffectual control of vehicle weights and loads has contributed to the rapid deterioration of road segments. Such control has been a major concern of the GOJ. Although an old weight limit control law exists in Jordan, the GOJ in recognition of the need for strict control has initiated a new enforcement law which is pending final signature. In a recent letter to USAID, the Minister of Public Works reiterated this issue and pending actions. Additionally, the permanent weighing station in Ramtha is nearing readiness and the eight portable scales are being used for spot checks with fines being levied against weight limit violators.

d. Lessons Learned -

(1) Construction contracts with the Host Government should provide for price escalation clauses, especially for such major materials as fuel, steel, asphalt and cement. This is particularly necessary when the price of such materials is determined by the government and/or major quasi-public corporation which have a monopoly on the supply of these items.

(2) Contractor pre-qualification procedures should include an analysis of the contractor's financial, managerial, and technical capabilities as they relate to his present and expected work load. The over extension of contractors can prove to be very costly to both contractor and client. This problem can be particularly acute in countries where contractors' managerial capabilities have not kept up with the rapid pace of growth and development.

(3) Contract conditions and bills of quantities provided for almost one million cubic meters of unclassified excavation, with the contractor being solely responsible for establishing the quantity of rock excavation and allowing for it in his price. The contractor claimed that much more rock was encountered than was originally envisioned, with a resulting financial loss and project delay. Those problems could have been avoided by either providing for separate unit price for rock excavation or by providing complete data on underground conditions.

(4) It is important that appropriate control of vehicle weights and loads be exercised in order to reduce both accident and maintenance costs. The assumption that the weight and load limit law would be effectively administered was valid. The GOJ has utilized the portable scales for spot checks and has levied fines. However, political and economic realities, both domestic and international, appear to have placed serious constraints on the extent to which the laws can be enforced.