Final Report

Expansion of the Activities of the Afghan Construction and Logistics Unit

Volume 1

Submitted to the

Office of the A.I.D. Representative for Afghanistan Affairs

Under

Delivery Order No. 3, Contract No. 306-0205-C-00-9385-00

December 1989

Submitted by

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EXECUTIVE SUMMARY

The recommendations and financial plan provided in Volume I of this report elaborate an overall plan of expansion for the Afghan Construction and Logistics Unit (ACLU). This plan is based on conclusions described below, which draw upon analyses reported in Volume II.

When repatriation of the Afghan refugees now in Pakistan gets fully underway there will be a transport-fleet requirement of about 3,260 10-ton equivalent trucks to haul food and other commodities to these refugees, as well as to internal refugees. There may be an available fleet of up to 17,200 equivalent 10-ton trucks. Thus, a case cannot be made for increasing the ACLU fleet on the basis of anticipated shortfall in vehicle capacity.

It is also unlikely that the ACLU will be able to influence the tariffs charged by the private sector through competitive pricing, as the ACLU currently accounts for less than one-half percent of available trucking capacity.

However, the procurement of 200 additional four-wheel drive vehicles for the ACLU is recommended, because privately owned fleets are unsuited for cross-border assistance on penetration roads. Although frequently used, these heavy, two-wheel drive vehicles are not able to negotiate poor roads without blocking the way for others. Frequent breakdowns have caused low vehicle utilization and added to the physical exposure of the trucks. These factors have greatly increased tariffs.

Cooperating with the private sector, the ACLU can fulfill several important needs during the coming two years:

- First, through expansion of its fleet, the ACLU can increase the tonnage of humanitarian assistance commodities that it hauls on penetration roads leading to the several eastern provinces of Afghanistan and beyond.

- Second, the ACLU can become prepared, also through expansion of its fleet, to participate in transport operations during the repatriation phase. The ACLU would fulfill special roles, utilizing four-wheel drive vehicles.

- Third, the ACLU is able to reduce greatly the cost of transport on penetration roads (and later primary and secondary roads) through activating and expanding its road repair/maintenance capacity.

- Fourth, in addition to servicing and maintaining its own fleet, the ACLU might participate with O/AID-/REP and private entrepreneurs in providing maintenance services for privately owned trucks. Along with road improvement, this is likely to contribute significantly to the success and economy of transport operations.

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LIST OF ACRONYMS

AAM	Activity Approval Memorandum
ACLU	Afghan Construction and Logistics Unit
A.I.D.	Agency for International Development
AIG	Afghan Interim Government
CEP	Commodity Export Program
CCSC	Construction Control Services Corporation
DOD	Department of Defense
IRRPA	Infrastructure Rehabilitation and Reconstruction Project for Afghanistan
GOP	Government of Pakistan
MSH	Management Sciences for Health
NWFP	Northwest Frontier Province of Pakistan
O/AID/REP	Office of the AID Representative for Afghanistan
PVO	Private Voluntary Organization
PSC	Personal Services Contractor
PVO	Private Voluntary Organization
START	Short-Term Assistance for Rehabilitation Team
UN	United Nations
UNDP	United Nations Development Programme
UNHCR	United Nations High Commission for Refugees
UNILOG	A logistics organization formed by UNHCR and WFP
USAID	A.I.D. Mission
VITA	Volunteers in Technical Assistance
WFP	World Food Programme

ACKNOWLEDGEMENTS

Many persons have contributed greatly to this report through the sharing of information. Although hard data of the kinds normally expected for transport studies were not available, often it was possible, through interviews with experienced persons, to obtain rough estimates for parameters such as transport capacities. For the refugees in Pakistan and those remaining in Afghanistan, the geographical distribution of their origins could be only roughly estimated. The assessment of road conditions inside Afghanistan and travel times on these roads relied on verbal reports of persons who had travelled the roads.

A complete list of persons interviewed is provided in Appendix B. All were very cooperative and helpful, and some were called upon for lengthy or repeated interviews. Messrs Bijleveld and da Silva each devoted over an hour to interviews and were especially forthcoming with information concerning UN plans for refugee repatriation. This information was crucial to the general direction taken by the study.

During several interviews, Mr. McGovern contributed most of the information concerning road surveys completed and underway, road conditions inside Afghanistan and UN plans for addressing road- improvement needs. He also shared copies of maps, reports and road survey-forms.

Mr. Scott found time in his busy schedule for four or five interviews, some on off-duty hours. He was very helpful in providing information concerning current ACLU operations and cost factors.

The work of Dr. English was very useful, as was information that he provided in an interview.

A most rewarding experience was interviewing ACLU drivers and convoy leaders and seeking to learn what it is really like to drive the almost impossibly rough penetration roads -- being concerned also with the dangers from land mines below and aircraft from above. During the discussion, they cited a problem with long stretches of roads where trucks from opposite directions cannot pass without leaving the road. When asked how this problem is overcome, they reported that it generally requires about an hour of discussion before the braver driver of the two decides to leave the road, breaking new tracks among the mines.

PREFACE

This report was prepared in response to Delivery Order No. 3 of A.I.D. Contract No. 306-0205-C-00-9385-00, the Afghanistan Series of Studies Project. This contract is a joint venture between Robert R. Nathan Associates, Inc. and Louis Berger International, Inc. The field work, extending over the period June 23 through July 16, 1989, and preparation of the draft report were performed by a team consisting of Dr. Richard E. Gibson and Dr. William H. Griffiths, both employed by Louis Berger International, Inc. Mr. Harvey Lerner and Ms. Barbara Phillips contributed home office technical backup and report drafting and preparation assistance to the project.

The report is presented in two volumes, with the current document (Volume I) corresponding to the institutional analysis of ACLU and the second volume containing the technical analysis of the Afghan transportation system.

I. INTRODUCTION

This report develops and elaborates a plan for the expansion of the Afghan Construction and Logistics Unit (ACLU), including both the administrative aspects of ACLU as an institution and the technical aspects of the transportation system within which the institution operates. Appendix A presents the formal Terms of Reference for this work. The remainder of this introductory chapter presents a brief summary of the background to the project.

The ACLU is an all-Afghan organization which currently is a part of the Ministry of Reconstruction of the Afghan Interim Government (AIG). Its two missions are to transport humanitarian assistance commodities into Afghanistan during the continuing war, and to assist with the repatriation of refugees whenever resettlement becomes appropriate.

In order to fulfill its missions, the ACLU employs 514 persons assigned among the following three major functions:

- Transport operations to dispatch nearly 100 ACLU and AIG vehicles.

- Construction operations intended primarily to improve roads and bridges inside Afghanistan in order to facilitate transport operations. There are presently two construction teams, both well equipped with heavy construction machinery and other tools. Activities to date have included training and construction of ACLU dispatch and maintenance facilities near Peshawar. Preparations are presently underway to move one of these teams into Afghanistan to repair roads. The other will erect a Bailey bridge just inside Afghanistan.

- Vehicle/equipment-maintenance operations to provide first- through third-echelon maintenance (up to engine

and drive-train replacement, but not overhaul) on its own transport vehicles and heavy construction machinery.

The ACLU was formed in mid-1988 at the same time training in operation and maintenance of construction machinery was started. Transport operations started in November 1988, with the dispatch of the first cargo-truck convoy into Afghanistan. Operations have been conducted from a 4.5-acre "truck farm" near Peshawar, while necessary buildings and other facilities are being erected. At the time of our field survey, construction was nearly finished.

In January 1989, the US firm, Construction Control Services Corporation (CCSC), signed a contract to provide technical assistance to the ACLU. For this purpose, a team of four expatriates and nine local employees was fielded beginning in March 1989. A fifth expatriate specialist was to arrive in August. Thus, ACLU/CCSC operations are presently in a shake-down phase. During the brief time of its existence, the ACLU's progress has been remarkable, especially considering that technical assistance has been available for only three months.

II. COMMENTARY ON ORIGINAL ACLU OPERATIONAL PLANS IN LIGHT OF CONDITIONS TODAY

The ACLU's operational plans are set forth in various clauses of CCSC's contract, which went into effect in January 1989. Many of these clauses originated from the Activity Approval Memorandum (AAM) and Scope of Work for technical assistance to the Commodity Export Program (CEP) transport component, somewhat more general documents that were prepared in early 1988. The latter two documents probably reflected, in the main, A.I.D. and Government of Pakistan (GOP) notions of operational plans for an Afghan transport and construction entity (later to be named the ACLU) as of about one year ago. They form the basis of this commentary.

Goals and Purposes

Goals and purposes of the amended CEP, of which ACLU's operations form a key element, are quoted from the Scope of Work as follows:

> ...intended to expand assistance to the people of Afghanistan during the present period of armed conflict and also during a future period of improved security in which refugees and internally displaced persons return to their homes. Thus, the project has two goals and the Transportation System component of the project has two purposes relating to the particular security environment which may prevail. At times during implementation, it is possible that one purpose and goal will be in effect in some parts of Afghanistan, while the other purpose and goal apply to other parts.
>
> The goals of the amended CEP are as follows:
>
> 1) As long as the war lasts, to ease the burdens of war on persons who remain in Afghanistan.

2) As soon as security permits, to help Afghans re-establish themselves quickly in their towns and villages.

The purposes of the Transportation System Component are:

1) As long as the war lasts, to provide assistance to the Alliance or other free Afghan authorities for transportation of commodities to persons remaining in Afghanistan to meet their urgent food, clothing, shelter and rehabilitation needs.

2) As soon as security permits, to provide transport assistance to free Afghan authorities and the international donor community in the repatriation of refugees, provision of their short-term basic needs, and instilling self-sufficiency for the long term.

The transport assistance referred to above may involve assistance in:

- Procurement of additional transport vehicles and road-construction equipment.

- Transport of commodities directly to end users or to primary and secondary distribution points within Afghanistan with trucks provided under the original and amended CEP and possibly with commercial vehicles.

- Temporary repairs of Afghanistan's primary road system, airports and other roads as appropriate, employing construction units described herein.

- Repair and maintenance of any transport vehicles involved in cross-border humanitarian assistance or repatriation, to the extent of the capabilities of maintenance centers to be established.

From discussions held with O/AID/REP, the GOP, UN and contractor personnel, the two goals and two purposes quoted above appear to remain consistent and appropriate with current thinking. However, the elaboration of transport assistance which follows the second purpose above should be modified in light of the manner in which the ACLU operated during its formative period and developments inside Afghanistan during the past year.

Assuming availability of adequate funds, future transport assistance should include a revised list of activities, as cited below.

- Procurement of additional transport vehicles has not occurred since the above was written. As described below, additional purchases would appear prudent, but the mix of vehicle types should favor smaller four-wheel drive trucks and fewer trailers. Additional construction equipment has been purchased, but more is needed to carry out urgent road repairs.

- The transportation of commodities to end users or distribution points within Afghanistan should involve heavier reliance on commercial vehicles than originally envisaged. Although the data concerning the number and condition of the private truck fleet inside Afghanistan are soft, more information about it is available now than was the case a year ago. The donor/PVO community has gained confidence in this fleet.

- Repair of Afghanistan's primary road system has not proven feasible to date. The original operational plans were based on a faster wind-down of the war than has occurred, and many sections of the primary road system remain insecure or actually held by the Kabul regime. Thus, most humanitarian assistance consignments from Pakistan are over "penetration routes" originating at several points along the border. It appears likely that these routes will be heavily used for some time--possibly well into the period of reconciliation.

  ACLU plans should include regular work on these routes, and this will require more equipment than is presently available. The plans should also include close coordination with other donor agencies (such as the UNDP). The ACLU should develop a bridge-repair capacity (in addition to its ability to erect

Bailey bridges), as well as a de-mining capacity. In the interest of transport operations economy, serious work should start as soon as possible.

However, it remains quite important that Afghanistan's primary road system be repaired as quickly as possible, as this will significantly reduce the cost of transport. It is likely that relatively inexpensive repairs, sufficient only to keep traffic moving at higher speeds in dry seasons, could be accomplished by machinery units such as the ACLU's, whenever and wherever security permits. Permanent rehabilitation of these roads will be beyond the ACLU's capacity.

- To date the ACLU has performed repairs and maintenance on only its own vehicles and a limited number of similar AIG vehicles. It would prove cost-effective to extend these services to the private sector at an early date. A series of repair stations extending along several penetration routes (and later on the primary road system), along with a few centrally located second-or third-echelon maintenance centers, would result in reduced trucking charges. The reasons for present high charges are obvious. Private owners are asked to risk heavy investments in their trucks on extremely rough (and often mined) roads, knowing full well that even minor breakdowns will leave their trucks parked in remote areas for extended periods of time.

ACLU's revised activities are more fully described in later sections of this report.

Transport Operations

As originally envisioned, the ACLU was to provide transport services from Quetta, as well as Peshawar. The ACLU now operates exclusively from Peshawar. It is shown elsewhere in this report that transport from Quetta to many sections of Afghanistan is considerably less expensive than from Peshawar.

Cross-Border Assistance

As originally planned, the ACLU has participated in cross-border assistance by transporting CEP commodities, PL-480 wheat and Department of Defense-donated surplus commodities.

Beyond original plans, the ACLU has recently begun hauling for other cross-border projects such as those managed by Volunteers in Technical Assistance (VITA) Shipments for UNO, MSH and other PVOs are likely to follow. A schedule of transport charges has been prepared for this purpose. (For cross-border projects which are funded directly by O/AID/REP it will be necessary to transfer funds to the ACLU through a paper transaction rather than a direct exchange of funds.)

Repatriation Operations

Originally, it was expected that refugees and their belongings would have to be transported back to their home villages, possibly within a short time span. Conventional wisdom among concerned donor/relief agencies and PVOs now holds that repatriation will occur over a period of many months and that all but the poorest of refugees will find their own way back, primarily via commercial truckers.

The agencies are loathe to entertain any plans for an organized return because of a number of factors, including the independent nature of the Afghan character. It is felt that all decisions concerning repatriation should be left in the hands of the refugees.

Thus, the main task involved in refugee repatriation is believed to be movement of building supplies and relief commodities needed to sustain the returnees and their countrymen -- at least until crops are harvested successfully.

The plans of UNHCR during the repatriation phase are noteworthy. Rather than make direct distribution of food commodities, that agency plans to bolster the existing market system. Donated commodities would be sold to traders who would ship them into Afghanistan. "Forgery-proof" ration books would be issued to the refugees who would take them to Pakistani banks, exchanging them for Rupees. The money would be used to purchase their transport and to purchase food when they arrive. In remote valleys, not easily reachable by trading systems, direct (traditional) distribution of food commodities and building materials may have to be made. UNHCR is now gathering data to determine the areas to which refugees will return and which are likely to be reached by traders.

Maintenance Centers

The original Scope of Work envisaged maintenance centers "initially at Peshawar and Quetta and later at up to four regional commodity distribution depots". The Peshawar and Quetta centers were to be transportable to inside Afghanistan. All centers were to be equipped to provide preventative maintenance and repairs for ACLU and Alliance vehicles, as well as those of other donors where requested and approved by O/AID/REP.

These plans were based on early availability of the primary road network, and did not take account of an extended period of cross-border assistance. They may remain valid for the repatriation phase (depending on developments), except that it is likely to be more appropriate to provide assistance to the private sector, rather than other donors. UNILOG is the only other agency known to have plans for a fleet of trucks, and it is now opening a maintenance center near Peshawar. Additional small centers, housed in structures assembled from shipping containers, are planned for inside Afghanistan. Since the UNILOG fleet will have different vehicles than those of the ACLU and the private sector, it will not be possible to combine services.

The ACLU has started a first-rate maintenance center near Peshawar. It is recommended that one be started in Quetta as originally planned. Additional maintenance facilities are presently needed inside Afghanistan along penetration routes to provide emergency service for ACLU, AIG, and private vehicles.

According to an active trucker who was interviewed: "My biggest headache is maintenance inside Afghanistan." He felt that the second most pressing problem is the condition of roads; he pointed out that fixing the roads would go a long way toward solving his maintenance problem. This individual (who has earlier experience working for a PVO) has prepared a proposal entitled "Mechanical Workshops", in which he proposes the establishment of small maintenance centers along a major route from Waziristan, through the Hazarajat to Baghlan. He would have a "main station" at the beginning, inside Pakistan (movable for later shifting inside); "substations" at Ghazni, Maidan-Wardak (Chak-i-Wardak), Tezak (in the Hazarajat), Sar-i-Pul and Baghlan; and a mobile workshop. He estimates the total cost at about $167,000 -- a figure considered to be somewhat low.

Road Repairs and Rehabilitation

Cross-Border Assistance

As noted in Section I, the end of the war and the expected availability of the primary road system have been delayed. Cross-border humanitarian food and other assistance continue on a relatively large scale, using roads

leading from the border points to locations in the several adjacent provinces of Afghanistan and to provinces beyond. For purposes of this report, such roads are referred to as "penetration routes".

Project START[1] has identified six of these routes as receiving the heaviest use (said to range from 50 to 200 vehicles per day). Five of the six routes, of which 641 kilometers have been surveyed, are shown on the map on Figure 1 and described below (from southwest to northeast):

- In Kandahar Province, from near Spinboldak, through Ber Mei and terminating at Baman (near Kandahar), approximately 225 km of which is over flat terrain.

- In Paktika and Ghazni Provinces, from Qamarudin, through Shinkai and Nava terminating at Makur on the Kandahar-Kabul Road, roughly 200 km in length. There are three alternate routes that are used, depending on wartime activities and road conditions.

- In Paktika and Ghazni Provinces, from Shkin through Urgun and Sharan and terminating at Bande Sardeh (a dam), near Ghazni. There are two steep passes after Urgun. The length is over 150 km.

- In Paktia, Logar, Wardak and Bamyan Provinces, from Teri Mangal through Chak (on Kandahar-Kabul Road) to Bamyan. It is over 400 km in length, but only about 140 km is said to require maintenance. Much of the route is fairly flat, but there are other sections with steep grades and tight turning radii. There are three long detours that are used to avoid mined sections.

- In Kunar Province, from Barikot through Asadabad to Koz Kunar. For most of its 100 km-length it follows the Kunar River. There are erosion problems, and slides from canyon walls frequently block the road. The greatest bottlenecks occur at Nowa pass, where frequent mud slides occur.

- In the Kundahar, Hilmand, and Nimroz Provinces, the Kundahar-Hilmand-Hilmand-Nimroz penetration route.

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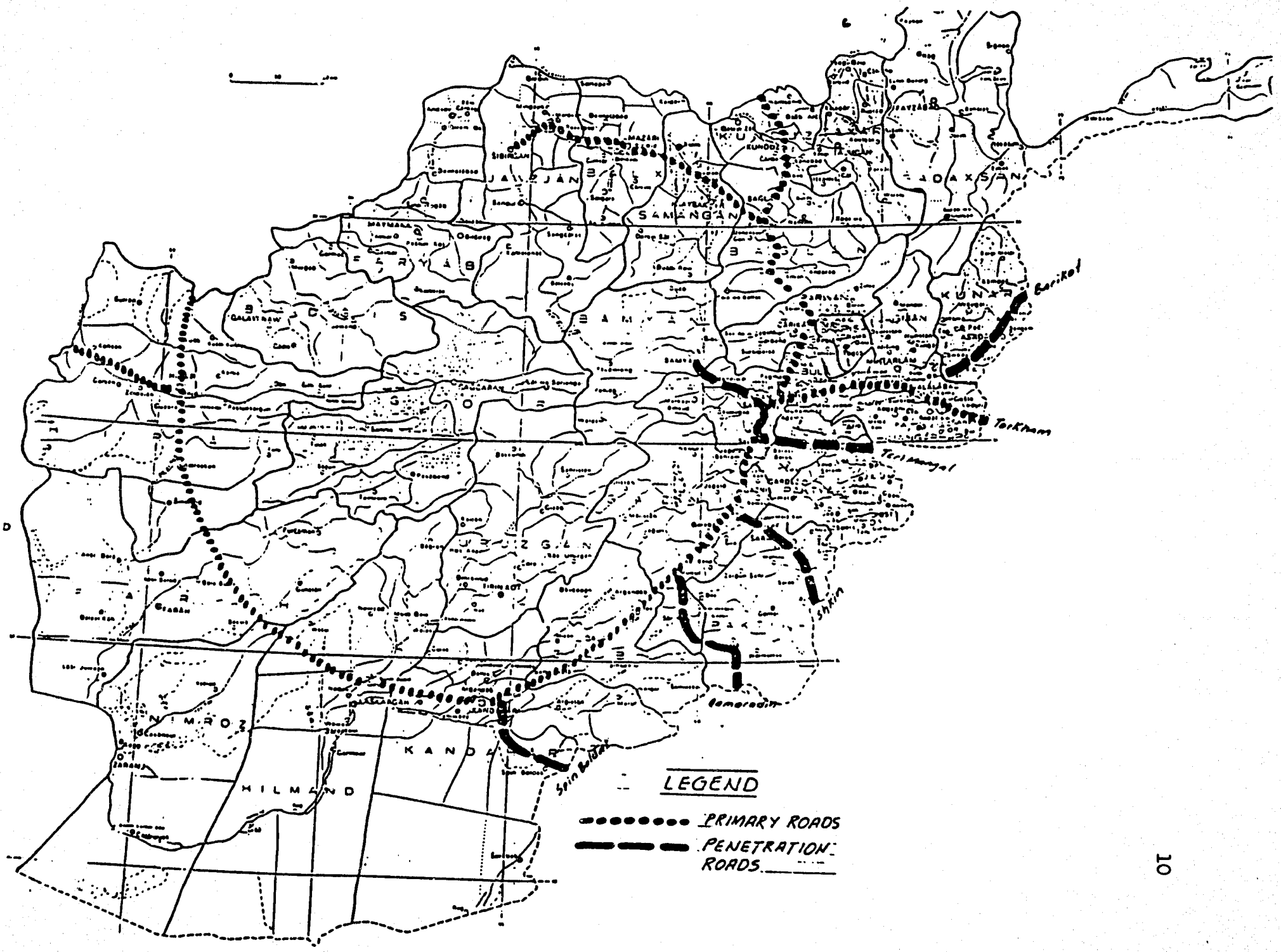
1. Short-Term Assistance for Rehabilitation Team -- an outgrowth of Operation Salam, employing a group of Afghan engineers seconded part-time from PVOs and an engineer from O/AID/REP.

Exhibit I - Penetration Roads



The first three roads described above terminate on or near the Kandahar-Kabul Highway, and the fourth crosses it. The fifth road ends near the Torkham-Kabul Highway.

Other roads, presently used and proposed, are reported to have importance also. Illustrative of these are Kandahar to Herat (on a route swinging north of the highway to avoid a contested bridge at Grishk), a road from Garam Chasma in north Chitral to Fayzabad in Badakshan, another from Garam Chasma over mountainous terrain to a connection with the Panjshir Road and from Pech to Laghman.

Although no traffic counts have been made on these roads, the Teri Mangal to Chak Route is known to be the most heavily used. Most of the ACLU's consignments have been along this route. Probably the next most heavily travelled route is Barikot to Koz Kunar. It is reported that some of the travel on this road is "commuter" traffic--refugees returning for short periods to farm their land. The least travelled of the six roads is probably Qamarudin to Makur.

Only the road in Kandahar Province is suitable for larger trucks, and then only in dry weather. All of the roads are mined, with many sections being mined repeatedly (where the roads pass near villages sympathetic to the Kabul Regime).

As a result of the planning initiated by Project START, it appears likely that the UN will mobilize a large infrastructure project which will include maintenance of these roads (Infrastructure Rehabilitation and Reconstruction Project for Afghanistan--IRRPA). The project calls for two-man maintenance crews, each maintaining one kilometer of road. Machinery crews will be available for the heavier work. However, it is considered unlikely that funding and technical assistance can be in place before a year or so.

The ACLU presently has the capacity to improve these roads (albeit unproven as yet). The ACLU can fill the gap by providing a service that will greatly reduce transport costs (whether by the private or public sector).

Repatriation Operations

As noted elsewhere within this report, it is expected that the primary road system of Afghanistan will be available before it will become necessary to support large numbers of returning refugees. Original plans for the ACLU included emergency repairs to this network, as needed to keep trucks moving.

Presently, control of important segments of the primary road alternates almost weekly, passing from AIG forces to the Kabul Regime and back again (particularly the Jalalabad-Kabul Section -- during early July 1989). Sections

of the all-important Kandahar-Kabul Link are understood to remain in enemy hands. Kandahar-Herat is frequently out of service due to dispute over an important multi-span bridge over the Helmand River at Grishk.

Physical conditions on the Kandahar-Kabul and Kandahar-Herat Roads are reported to be reasonably good. These segments were built to a higher standard than was the Kabul-Jalalabad Link. The latter road is said to be almost impassable at times, especially in the Kabul Gorge during winter months. Before the war, it was a six- to eight-hour trip by truck from Kabul to Torkham. Under the best of conditions, it is now a two-day trip (before intensified fighting started at Jalalabad), with the first night at Sarobi and the second in Jalalabad. The driving time is longer due both to road conditions and security. The maximum speed is reported as 20 kilometers per hour for most of the route. Clearing by large crawler-tractors and some grading could increase this to 40 kilometers per hour. For speeds beyond 40 kilometers per hour, surfacing and other maintenance would be required.

When the time comes, it will be feasible to repair the road from Torkham to Kabul to permit truck travel. There are three to four 25-40-meter single-span bridges that will require replacement and several multiple-span masonry arch bridges on the Jalalabad Plain. Abutments and piers remain in place on some of them. The bridges span streams that remain dry during most of the year, so it would be possible to detour around them and cross without too much trouble while restoration is underway.

The Gandamak Road (also called the "Lataband" Road) could be improved sufficiently to permit the passage of Kabul-Torkham traffic. This road is longer than the main road and is unpaved. However, it is relatively flat.

Bridges

Literally hundreds of bridges are out of service on the primary and other roads of Afghanistan. Many of these bridges are simple spans of moderate length (20 meters) founded on masonry abutments and piers. Photographs indicate that the superstructures (girders, beams, and slabs) are usually down, but the foundation elements are still intact.

ACLU crews could be trained and equipped to erect pre-cast concrete and steel bridges of moderate length (up to 20 meters--greater lengths would be very difficult to transport). Where longer bridges must be replaced, the construction of temporary detour routes employing Irish crossings or culverts may prove feasible. Many of the streams in Afghanistan are dry throughout most of the year.

Technical Assistance

Staffing

A total of seven key positions were originally planned for the technical assistance team. At present the CCSC team includes four (soon to be increased to five) individuals who are dividing the work planned for the original seven positions in the following manner:

CCSC Position

Originally Planned Position	Incumbent	Title
Chief of Party	G. Scott	Chief of Party
Administrative/ Financial Officer	H. Joffe*	Administrative/ Financial Officer
Training Coordinator**	J. Winslow	O&M Manager
--	J. Klaasmeyer	Training Consultant
Transport Coordinator	G. Haidar***	Transport Coordinator
Maintenance/Parts Coordinator	J. Winslow	O&M Manager
Civil Engineer	Vacant	
Logistics/ Maintenance Coordinator	J. Klaasmeyer	O&M Consultant

* To have arrived at post July 15. Earlier incumbent returned to US after 90-day assignment.

** Planning of training by Winslow, implementation by Klaasmeyer.

*** To have arrived at post August 1. Position vacant from inception.

In addition to the above, the team includes an expatriate administrative assistant who was to be no longer be available after July 30. A need may

exist to fill this vacancy, at least temporarily, as mobilization efforts are still underway (for example, for which training/orientation of local staff in the use of computers).

The civil engineer position listed above was not included in the CCSC contract, apparently because of a decision to add a PSC position to the O/AID/REP Peshawar staff. The PSC civil engineer was expected to assist CCSC and other cross-border projects with implementation.

Studies and Surveys

Original plans called for studies and surveys to be conducted outside the ACLU's technical assistance (TA) contract, and apparently that continues to be appropriate in most instances. Short-term assistance of a more operational nature is also required, and it may be desirable to accomplish this through the TA contractor. Whatever the mechanism, it appears urgent that the TA team receive help in some areas in the immediate future. Recommendations are provided in Section VI.

Included in original plans and in the CCSC contract is a requirement for conducting road surveys in support of ACLU road-improvement activities. However, in the absence of a civil engineer among the CCSC's key personnel, this work is presently being done by others. Survey work is being accomplished under the UN START Project and also under an O/AID/REP-funded Purchase Order with a group of Afghan engineers.

The START surveys, by a group of Afghan engineers assisted by O/AID/REP's civil engineer, have covered the six roads described in Section II. A completed report is available for the Teri Mangal to Chak Route, and reports were to be available for the other five by the end of August, 1989. The reports were to include detailed maps and photographs for all the roads.

The Purchase Order survey was to be a kilometer-by-kilometer survey of the same six roads, with estimated quantities and costs. The design of survey forms had been completed and training of surveyors was underway at the time of the field study for the present report. Arrangements had been made for eight surveyors (four two-person teams) to depart on July 17. According to the O/AID/REP civil engineer as of the writing of this report, data should start becoming available by mid-August. The contract was scheduled for completion by the end of August.

Procurement Services

The TA contractor was originally to procure heavy transport trucks, trailers, road construction equipment, spare parts, and maintenance center items. These procurements have instead been assigned to the CEP contractor, RONCO, along with all other purchases needed by the ACLU,

except items purchased in Peshawar. This is no doubt more economical than having both contractors involved in the onerous chores of procurement; however, some coordination problems have arisen as a result of the division of work. These are described in Section IV.

III. ACLU CARGOS – INCEPTION TO PRESENT

Commodities Hauled-Tonnage

The ACLU was established in November 1988 and had been in operation for approximately eight months at the time of the field survey. The tons of cargo carried between Peshawar and the destinations served by the ACLU from 16 November 1988 to 31 May 1989 are shown in Table 1. The organization has operated under extremely difficult conditions, especially in terms of the quality of the roads on which it must operate, and this is reflected in the operating statistics shown in the table. Over this period, the ACLU operated 114 convoys with a total of 1,210 truck trips. It has carried over 6,700 tons of cargo and produced more than 1.3 million vehicle kilometers and 3.5 million ton kilometers.

The commodities hauled to date include foodstuffs (wheat, flour, rice, ghee and dehydrated food packages), kerosene (in 55-gallon drums), and gabions for VITA. Although most DOD-donated commodities have been hauled by Alliance party trucks, some have been used to top off the loads of ACLU trucks. These have included medical supplies and clothing. The specific commodities carried have not been recorded by the ACLU, but RONCO monitors have recently begun recording the commodities, and this information will be available in the future.

Origins/Destinations

The destinations have been primarily in the eastern, east-central and southern regions of Afghanistan and the border regions between Pakistan and Afghanistan, all relatively close to Pakistan. The average round-trip distance is 1,048 kilometers, even though the shortest-route distances to the destinations would require considerably shorter travel distances (see Volume II, Table 4). This is attributable to the need to avoid the more direct routes for security reasons, and to the impassibility of a number of the shorter routes because of road conditions. The average time for a two-way trip is eight days, resulting in an average of only 131 kilometers per operating day, again attributable to the conditions under which the ACLU must operate. The average cargo per loaded truck (excluding pickup trucks) is 5.6 tons. Considering that the trucks are essentially empty on the return trips, the average load is only about half of this.

TABLE 1: DESTINATIONS OF ACLU SHIPMENTS
16 NOVEMBER 1988 TO 31 MAY 1989

REGION	Province	Place	No. of Convoys	No. of Truck Trips	Avg. Round Trip Distance (Km.)	Avg. Time Per Trip (Days)	Total Cargo Carried (Tons)	Total Vehicle Kms.	Total Ton Kms.	Avg. Km./Day per Truck	Avg. Cargo/ Truck (excl. PU) (Tons)	Trips by Type of Truck: Hino 4x4	Mercedes Benz	Bedford, Nissan, Isuzu	Hino 4x2	Pickup
E	Kunar	Noorgal	1	2	660	4	10	1320	3300	165	5.0	2				
		Not spec.	1	9	520	4	45	4680	11700	130	5.0	9				
E	Nangrahar	Jalalabad	15	114	212	2	570	24168	60420	106	5.0	18		28	68	
		Khaywa	16	93	641	4	465	59613	149033	160	5.0	93				
		Surkhroad	1	4	280	2	20	1120	2800	140	5.0	4				
		Abdulkhail	1	3	765	8	15	2295	5738	96	5.0	2			1	
		Daranoor	1	12	660	4	60	7920	19800	165	5.0	12				
E	Paktia	Jaji	1	2	760	6	10	1520	3800	127	5.0	2				
EC	Ghazni	Muqur	1	11	1795	20	95	19745	85263	90	8.6	3	8			
		Qarabagh	1	11	1637	15	55	18007	45018	109	5.0	11				
EC	Kabul	Paghman	2	16	2200	18	101	35200	111100	122	6.3	2	12			
EC	Logar	Azra	3	57	680	5	330	38760	112200	136	5.9	38	10	8		1
		Azra/Surkhab	1	19	1200	3	90	22800	54000	400	5.0	18				1
		Not spec.	1	6	1080	16	30	6480	16200	68	5.0	5			1	
EC	Wardak	Sanglakh	14	242	2143	13	1495	518606	1601893	165	6.4	151	66	6	10	9
		Maidan	5	59	1940	18	365	114460	354050	108	6.4	28	29			2
		Jalriz	1	26	2700	14	245	70200	330750	193	9.8	2	23			1
		Durani	3	57	1717	16	360	97869	309060	107	6.4	40	16			1
S	Paktika	Sharana	1	10	1400	11	50	14000	35000	127	5.0	10				
								0								
Border Area		Teri Mangal	28	360	570	4	1820	205200	518700	143	5.1	197	8	5	149	1
		Miran Shah	6	33	545	3	165	17985	44963	182	5.0	4			29	
		Parachinar	1	5	152	3	25	760	1900	51	5.0	3			2	
		Azam Warsak	6	46	952	4	230	43792	109480	238	5.0	16		16	14	
		Mata Sangar	1	6	560	3	30	3360	8400	187	5.0	4		2		
		Angoor Ada	1	2	1050	4	10	2100	5250	263	5.0	2				
		Khirdand	1	5	435	4	25	2175	5438	109	5.0	5				
			114	1210	1048	8	6716	1334135	3519959	131	5.6	681	172	65	274	16

Source: ACLU records

Assuming an average operating fleet of 80 trucks, the average truck productivity was about 2,570 km per month, equivalent to only 31,000 km per year. Total ton-kilometers averaged only 81,000 per year per vehicle. In addition, these figures are somewhat inflated, in that close to 20 percent of the recorded truck trips were made by Mercedes, Bedford, Nissan and other trucks which are not part of the regular ACLU fleet.

Routes and Road Conditions

ACLU convoys to date have travelled exclusively on penetration routes. The most frequently used route has been that leading into Afghanistan from Teri Mangal. Two convoy managers and three drivers were interviewed to gain some insight into driving conditions on this route. The following are their observations:

- For the first 180 km or so, from the border to Dobandi in Logar Province, the route is mountainous. This section is very rough and considered dangerous. The last 20 km distance requires about three hours to drive. It has many tight turns and is very steep. Narrow spots occur, sufficient for only one vehicle. Sections of it are muddy in wet weather.

- A 40-km road section over the Dasht-i-Dobandi (Dobandi Desert) follows. It is heavily mined and narrow for most of its length. For vehicles to pass one another, it is necessary to leave the single track, as backing up is not practical. The trucks are exposed to aerial bombardment in this section, up to about Zarghoon Shar.

- At a place called Denaw, three bridges are out within a short distance. One of these is over 30 meters long. They have been replaced with temporary wooden structures which are narrow and unstable, with drop-offs of over 10 meters.

- Later the route follows the Kabul-Paktia Highway for a short distance and crosses Pul-i-Alam. This section was paved at one time, but is now ruined. After a left turn toward Wardak, it crosses another tract of desert, Dasht-i-Baboos. In April, an ACLU driver and convoy manager were captured here and taken away by helicopter.

- Most of the loads carried by these particular drivers were dropped in Sanglahk and Jalraz, two villages in Wardak Province. Here the loads were transferred to mules and donkeys and taken into Kabul Province.

The drivers stated that they had encountered many private trucks, but often these were stuck or stalled, blocking the road. In order to keep moving, the ACLU trucks often have to assist the larger private trucks. One convoy was delayed some 13 days last winter, due to snow and to private trucks blocking the way.

IV. BRIEF REVIEW OF CURRENT ACLU OPERATIONS

Transport

Operations

Transport operations started in November 1988, with dispatch of the first truck convoy into Afghanistan. While operations have been conducted from a 4.5-acre "truck farm" near Peshawar, necessary buildings and other facilities are being erected. The construction was nearly finished at the time of the field survey.

Convoys, consisting of 10 to 60 trucks, are made up on short notice. Assembly and dispatching are from the truck farm.

Over 50 percent of CEP commodities and PL 480 wheat is presently transported by the ACLU. Most of these shipments are sent to an Alliance party or a Shura. Three Mujahideen guards are assigned to each truck, with two laborers for each 10 trucks. RONCO monitors accompany each convoy.

An early problem encountered was the mixing of different vehicles in a single convoy. Alliance vehicles, often 20-ton trucks without front-wheel drives, were assigned to accompany the smaller four-wheel drive ACLU vehicles. This resulted in many delays caused by the inability of the larger trucks to move as well as the others.

Fuel originally was troublesome, as it was necessary to fill trucks individually at commercial stations. Also, the fuel tanks that were furnished with the trucks were too small. These problems have been solved with the addition of a fuel depot at the truck farm, and by adding a 420-liter tank to each truck, bringing its capacity to 540 liters.

Transport Vehicles

The ACLU is presently operating with 86 seven-ton 4x4 heavy trucks and 20 3/4-ton 4x4 pickup trucks which were provided by AID. These trucks are of Japanese origin (Hinos and Toyotas) and use diesel fuel. They have proven generally reliable; however, the Hinos are said to be somewhat

under-powered at high altitudes. A more serious problem has been inadequate structural steel members in the frame supporting the truck box. Considerable time and expense have gone into correcting this problem (see section on "Activities", page 21).

It is possible that 52 additional seven-ton Hino 4x2 trucks presently owned by the GOP will soon be transferred to the ACLU. These trucks are presently being used to haul some 3,000 mules donated by the PRC.

Additional trucks belonging to the Alliance are available for emergency use and some already have accompanied ACLU convoys. These include approximately 160 seven-ton 4x4s (Hino), 200 3/4-ton 4x4s (Toyota) and 60 20-ton 6x4 Mercedes trucks. The seven-ton and 3/4-ton trucks were donated to Alliance parties by AID and the 20-ton trucks by the Saudi government.

A short-term specialist provided by RONCO has recently prepared specifications for additional trucks, should they be required. These specifications are presently not available, but are understood to cover two types of possible future ACLU trucks. They will be of U.S. source/origin and their specifications follow:

- Seven-ton 4x4s. Similar to ACLU's present Hinos, but with larger, supercharged diesel engines and heavier frames. Unit cost likely to be in $30,000 to $40,000 range.
- 14-ton 6x4s. Supercharged diesel engines. Heavy frames. $60,000 to $70,000 range.
- Trailers.

The following comments regarding the general utility of each type of truck now in operation and conceived of for the future are offered below:

- ACLU and AIG seven-ton Hinos, 4x4: These vehicles have proven generally capable of negotiating extremely rough, unimproved penetration routes. However, some of the roads are so bad that these relatively small transport trucks have to back up two or three times to make the sharper turns. Likely to be useful during full repatriation phase in moving food and building supplies from primary road distribution points to remote villages on secondary/tertiary roads. Problem with Hino frames has been corrected.

- ACLU and AIG 3/4-ton Toyotas, 4x4: Same comments as above, but of more limited utility due to lesser capacity.

- GOP seven-ton Hinos, 4x2: Useful on unimproved penetration roads only when included in convoys made up primarily of seven-ton 4x4s, and in dry weather. They will be of greater utility as penetration routes are improved and on primary road system during full repatriation operations, when they can increase their capacity by pulling trailers (especially on southern routes which are reasonably level).

- AIG 20-ton Mercedes, 6x4: Not suitable for unimproved penetration routes. These vehicles are occasionally used by the AIG and, reportedly, more often by commercial carriers. However, under most driving conditions they get through only with the greatest of difficulty. In particular, such vehicles should not accompany convoys of seven-ton 4x4s, which can move over much rougher terrain. They will be more suitable for use on the repaired primary road system, with or without trailers.

- ACLU seven-ton, US-made 4x4s (presently specified but not ordered): Same comments as for Hino 4x4s, except they are likely to be more powerful and durable, hence of even greater utility, both on unimproved penetration routes and for use in repatriation operations. They would be suitable for pulling five-to seven-ton trailers on the relatively flat highway in the eastern and southern sections of Afghanistan.

- ACLU 14-ton, US-made 6x4s (presently specified but not ordered): These vehicles have a longer wheel base than the seven-ton trucks and a more complex drive mechanism. Due to their added length, weight and lack of a drive-axle in front, they would be unsuitable for unimproved penetration routes. Although they would be capable of hauling large loads with trailers on the primary road system during repatriation, other trucks in the ACLU, AIG, UNILOG and private fleets will be available. There appears to be little justification for purchasing these particular trucks.

Construction

Activities

One of the ACLU construction crews has been occupied continuously with construction of needed ACLU facilities at the truck farm. These improvements are described below in the section entitled "Maintenance/Dispatch Center".

The other crew has been engaged in training and site preparation for a bridge. They are preparing to erect a Bailey bridge near Barikot, in Kunar Province. It will span the Kunar River, which is some 700 meters inside Afghanistan in this area. The bridge is to have a single lane and a 180-foot clear span. It recently arrived in Pakistan and has been shipped to a site where additional training will take place prior to actual erection.

The crews have received some training in operation and maintenance of ACLU's road construction equipment. However, the teams have yet to be assigned to roadwork inside Afghanistan, their originally planned mission and for which they have been equipped.

Although the teams have yet to function, seven of the ACLU's crawler-tractors (bulldozers) are operational. They are assigned to commanders inside Afghanistan, operated by ACLU personnel. Several of these need repairs, but are unable to "walk out". The ACLU is now organizing a service vehicle and crew to attempt repairs.

Construction Equipment

Construction equipment presently in the ACLU inventory includes the following:

- 4 dump trucks (4x4)
- 4 water tanker trucks
- 2 fuel tanker trucks
- 2 lowboy transporters
- 4 tag-along lowboy trailers
- 3 road graders (new)
- 2 road graders (DOD surplus)
- 4 crawler-tractors (D40-size)
- 3 crawler-tractors (D85-size)
- 16 tractors with trailers
- 1 front-end loader (new)
- 1 backhoe/front-end loader

- 4 front-end loaders (DOD surplus)
- 3 vibratory rollers
- 2 air compressors (with drills)
- 2 concrete mixers (1.0 cy cap)
- 4 self-propelled scrapers (10 cy cap)

One additional backhoe/front-end loader was expected to arrive in July or August.

Road Surveys

Surveys of road conditions are needed to plan and prioritize the ACLU's road-improvement efforts. The surveys described in Section II (see page 13) represent a good start, and it was hoped that factual data would become available from them shortly.

Plans have recently been made for O/AID/REP's civil engineer to conduct training for ACLU field staff in road surveys and design/construction. This will enable them to assign the crews to the most critical sections and to supervise the work more effectively.

Vehicle and Equipment Maintenance

Activities

Maintenance is underway in the midst of construction activities and stocking of the warehouse. A great deal of time and effort have been devoted to installing new truck-body supports (the original supports were undersized and unable to handle the loads), constructing larger fuel tanks for the trucks and performing various modifications on other equipment.

Downtime of the fleet is reported to be about 50 percent. This is high, but reasonable in view of the road conditions and time required for the modifications cited above. Downtime should decrease immediately to 30 percent to 40 percent with the completion of modifications.

The ACLU is presently providing limited spares directly to the AIG for maintenance of their Hinos and Toyotas. There have been only two requests to date. By the end of summer, two 25-ton wrecker cranes for mounting on existing trucks are expected to arrive. It is then planned that all parts supplied to the AIG will be installed by the ACLU.

Maintenance/Dispatch Center

This facility is nearly complete. It is located on a 4.5 acre plot of land a few miles west of Peshawar. Facilities recently completed by one of the ACLU construction crews include the following:

- New administration building, including dispatch area, offices for the transport manager, cashier and time-keeper and a drivers' lounge area.
- Renovated warehouse building, including parts storage, toolroom, unit bench repair shop and office. The building existed previously, but the concrete floor is new. All parts have arrived. Shelves are now being assembled.
- Fuel station, including a single pump and a large, half-buried tank.
- Sentry house.
- Eight open-air truck-repair bays (roofed, but no walls). Construction of these bays is nearing completion.
- Mosque, outdoor kitchen and vehicle wash-racks.

Parts, Supplies, and Shop Equipment

Many parts are being removed from shipping cartons and arranged on newly acquired steel shelves. Included are parts for up to third-echelon maintenance for Hino trucks and Kamatsu dozers and graders. Also stocked are parts for up to second-echelon maintenance for Toyota pickups (third- and fourth-echelon maintenance are commercially available). Parts have not yet been received for the DOD equipment (used bucket loaders, scrapers and wheeled tractors).

The toolroom is operational. A new bench repair shop is being organized.

Procurement

Local Procurement

The ACLU is responsible for all purchases made in the Peshawar area. These purchases are for small items needed to sustain day-to-day maintenance and administrative operations, and are limited to Rs. 20,000 per purchase.

This arrangement has not worked well, since the ACLU staff does not understand U.S. procurement procedures and are fearful of erring. The problem is avoided by inaction, and operations (including critically needed repairs) are delayed until needed purchases can be made by the overtaxed technical assistance staff. A serious training effort will be required if the ACLU is to retain this responsibility.

Offshore and Pakistan Procurement

All non-local ACLU procurement is provided by the CEP contractor, RONCO. Experience with their offshore procurement has been limited to a few vehicles and power take-offs for the Hinos. There have been no problems with these purchases.

Procurement in Pakistan (from Karachi and Lahore) has included items such as tents, steel tires, pickup parts and pintle hooks. Often it is not possible to forecast needs such as these beyond a week or so, but procurement through RONCO has been requiring in excess of 60 days. The basic problem appears to be that personnel responsible for procurement are not based in Peshawar, where they can quickly obtain information about detailed requirements and where they can witness the importance of these needs to overall operations.

Recommendations for correcting this condition as well as the need for training in local procurement are found in Chapter VI.

V. CONCLUSIONS

Rough estimates of the demand for ACLU transport services during repatriation operations are included in Volume II of this report. The analyses of that volume lead to several significant conclusions, including the following:

- Operating from both Peshawar and Quetta on the primary and secondary roads of Afghanistan, there will be a requirement for a fleet of about 3,260 10-ton equivalent trucks to serve repatriation needs alone. This is 25 percent fewer trucks than would be required operating only from Peshawar.

- Under the above conditions, annual requirements would be about 222,600 vehicle trips, 177 million vehicle kilometers and 510,000 vehicle days.

- There may be an available fleet of about 17,200 equivalent 10-ton trucks. Only about 19 percent of this capacity (3,260 trucks) would be absorbed by repatriation operations.

- Based on the above, a case cannot be made for increasing the ACLU fleet on the basis of anticipated shortfall in vehicle capacity.

- It is also unlikely that ACLU will be able to influence the tariffs charged by the private sector through competitive pricing. The ACLU currently accounts for less than one-half percent of available trucking capacity. (Under its present procurement plans, UNILOG cannot have much more effect in this regard.

In considering expansion of the ACLU, it is necessary to look at several missions that the ACLU might perform, both in cross-border humanitarian

assistance and in the eventual repatriation of refugees from Pakistan. It is especially important to consider the transport capacity of the private sector, and to ensure that the ACLU does not duplicate any portion of that capacity.

Whereas privately owned transport fleets in Afghanistan and Pakistan appear to be more than adequate to meet most repatriation needs (except off-road deliveries, i.e., where 80 percent of the pre-war population lived), and to assure competitive pricing of transport during repatriation and afterwards, they are considered unsuited for cross-border assistance on penetration routes. Also, whether these fleets can be kept operational is problematic. They are old, likely to have had little regular maintenance in recent times, and are operating on very poor roads.

Private truckers are presently hauling commodities on the penetration routes, but at great expense to shippers in terms of both time and money. These heavy, two-wheel drive vehicles are not able to negotiate poor roads without frequently blocking the way for others. Frequent breakdowns have caused low vehicle utilization and added to the physical exposure of the trucks. These factors have greatly increased tariffs.

The deployment of additional light, four-wheel drive vehicles on the penetration routes is needed. Although traditionally the private sector responds promptly to such needs, privately owned vehicles of this type have not appeared on the scene to date. This is not likely to occur in the near term because of the high risks perceived in operating new vehicles in a war zone--on mined roads. Almost all private trucks are of 1972-75 vintage, amortized long ago.

Cooperating with the private sector, the ACLU can fulfill several important needs during the coming two years:

- Through expansion of its fleet, the ACLU can increase the tonnage of humanitarian assistance commodities that it hauls on penetration routes leading to the eastern provinces of Afghanistan and beyond. Tonnages are presently increasing and this is expected to continue into the foreseeable future. This need could best be met by better utilization of ACLU's present light, four-wheel drive cargo trucks, along with the acquisition of additional four-wheel drive trucks.

- The ACLU can become prepared, also through expansion of its fleet, to participate in transport operations during the repatriation phase. Its principal role at that time is seen primarily as hauling foodstuffs and building materials from primary road depots or drop-off points to remote villages over

rough roads where private-sector trucks will not be able to travel. A secondary mission would be to haul moderately sized loads on the primary road system, using five- to seven-ton trailers.

- The ACLU is able to reduce greatly the cost of transport on penetration routes (and later primary and secondary roads) through activating and possibly expanding its road repair/maintenance capacity. The extremely high cost of transport today is attributable not only to wartime conditions, but also to poor road quality.

- In addition to servicing and maintaining its own fleet of transport vehicles and its construction equipment, the ACLU might participate with O/AID/REP and private entrepreneurs in providing maintenance services for privately owned trucks. Along with road improvement, this is likely to contribute significantly to the success and economy of transport operations.

As the ACLU becomes increasingly involved in transporting commodities, improving roads and establishing maintenance centers, its activities should be commensurate with political changes that actually occur. AIG forces should be in control wherever the ACLU goes--in order to protect life and equipment that is critically needed for the resettlement and rehabilitation of Afghanistan.

The ACLU is functioning smoothly at present, considering its short history of existence and the difficult conditions under which it works. The General Superintendent of the ACLU occasionally receives conflicting requests or guidance from the various groups with which he regularly works, i.e., the AIG Ministry of Reconstruction, Parties, GOP, O/AID/REP and CCSC.

The organization charts which are in effect appear appropriate to the tasks at hand, and most positions have been filled with qualified personnel. However, training in procurement is needed.

The key ACLU managers generally have good educations and some speak English very well. However, they seem to lack practical experience in transport operations, vehicle maintenance and construction. Several of them could benefit from short internships in the United States, working closely in private organizations with counterparts.

VI. RECOMMENDATIONS FOR THE COMING TWO YEARS

The following recommendations recognize that the penetration routes into Afghanistan may continue to be preferred over the old primary road system for some period after the fall of the Kabul Regime. This would be the case unless the AIG were able to establish control over the countryside, including all points along important segments of the primary roads. The recommendations target five categories: transport, construction, vehicle/equipment maintenance, technical assistance and ACLU management.

Transport

Vehicles

The procurement of 200 additional seven-ton, four-wheel drive trucks, 100 five-to seven-ton wagon-trailers and 30 pickups for the ACLU should be considered.

A larger ACLU fleet of light, four-wheel drive trucks is needed now for use on penetration routes. The ACLU is providing only a small portion of cross-border humanitarian assistance, while remaining cargos are being carried by heavier two-wheel drive vehicles which are unsuited for this purpose. These heavier vehicles, operated by the AIG and the private sector, require much more time to reach their destinations, resulting in higher costs. They often block the roads, impeding travel by more suitable vehicles. At the time this report was written, no VITA shipments of fertilizer had taken place, an indication of the difficulties being experienced by the heavier vehicles.

During the repatriation phase, these additional four-wheel drive vehicles will become extremely useful in moving supplies to remote locations far from drop-off points on the primary road system. They will be able to move on unimproved roads where the larger, limited-terrain vehicles are unable to go.

RONCO will be doing some truck leasing business for transport of fertilizer under the agricultural sectors agribusiness project. Although the

penetration roads will be relied on for the foreseeable future, and therefore four-wheel drive vehicles, it would be useful to monitor the RONCO project. Once large shipments are begun, an ACLU truck leasing program could be initiated based on the RONCO project.

Without an off-primary-road capability, it is possible that returning refugees would congregate around depots on the good roads rather than returning all the way to their original villages. Conceivably, this could result in an undesirable "urbanization" of the countryside. The present civilian fleet is essentially limited to heavy, limited-terrain vehicles.

Additional four-wheel drive pickup trucks will be required to service the expanded transport, construction and maintenance components recommended herein.

The wagon-trailers should be purchased for highway use in Pakistan and Afghanistan, mainly during the repatriation phase. As described below, these would be stationed at Quetta. These trailers will provide the ACLU with a capacity to act in special circumstances, and to keep its fleet active whenever it is not needed for off-primary-road deliveries.

Transport Operations

A new dispatch and maintenance facility should be started at Quetta. This facility should play an important role during the repatriation phase. As shown in Volume II, the cost of shipping to many provinces of Afghanistan will be much less from Quetta than from Peshawar.

Up to 100 of the 200 new trucks recommended above should eventually be stationed at Quetta during repatriation. They should be accompanied by a like number of wagon-trailers, since it will be possible in some instances to pull trailers over relatively flat highways. Based on operational considerations, the minimum number of trucks that would be required for economic operation at Quetta, is in the range of 50 to 100. **Positioning of these new trucks in Quetta, rather than the present Hinos, is recommended,** since they will be somewhat more powerful and better suited to pulling trailers.

During continuing cross-border operations, the appropriate number of trucks to be stationed at Quetta will depend on the number of consignments that the ACLU can attract with destinations in Kandahar, Zabul and south-western provinces using the Spinboldak-Ber Mei-Baman Road and possible destinations in Paktika and Ghazni Provinces along the Qamarudin-Shinkai-Nava-Makur Road. **It would be advisable to start small at Quetta,** allowing the volume of shipments to increase gradually, as dispatch and maintenance capabilities improve.

Finally, efforts should be made to identify legal trade goods for backhaul from Afghanistan, both to reduce the overall cost of transport and to assist Afghan producers in marketing their products.

Construction

Road improvements and bridge repairs inside Afghanistan should be given the highest priority in future ACLU funding. These improvements will contribute more than any other single activity toward reduction of transport costs, all of which will be paid by donor agencies, including the U.S. Government, well into the future.

As soon as possible, the two present ACLU construction crews should be fully staffed and equipped for road construction work, mobilized, and assigned to high-priority road segments on the Teri Mangal to Chak Route (as determined by road surveys now underway).

Prior to commencing regular road-improvement operations, it is crucial that the crews be provided with a full-time de-mining capability. Without such capability, all work areas, material and equipment-storage areas and camp sites will be in constant jeopardy, due to the manner in which mines have been spread in the vicinity of roads.

As work progresses, other equipment needs will become apparent, and these should be fulfilled promptly. Equipment on hand today is generally adequate for two construction teams; however, there is a shortage of large (D8) crawler-tractors and dump trucks. **The immediate procurement of six additional crawler-tractors (D8-size) and 10 dump trucks is recommended.**

As experience is gained, and equipment, personnel and training deficiencies corrected, road-improvement operations should be expanded to permit greater coverage. **It is recommended that two additional road-improvement crews be mobilized during the coming two years.** Depending on circumstances, it will probably be possible to integrate the ACLU crews into any future, broader UN project, such as the recently proposed IRRPA infrastructure project.

As soon as practical, two ACLU bridge-repair crews should be mobilized and trained. These crews should be equipped to erect steel and pre-cast concrete bridges of moderate length (up to 20 meters). As reported in Section II, there are many bridges of these types and lengths that can be put back into service with relative ease.

Although initially ACLU road-improvement and bridge-repair crews will be assigned to penetration routes, **it remains important that the primary road system be repaired whenever significant segments of it become secure.** This

will greatly reduce the cost of transport. It is likely that relatively inexpensive repairs, sufficient only to keep traffic moving at higher speeds in dry seasons, can be accomplished by ACLU's machinery units. Permanent rehabilitation of these roads will be beyond ACLU's capacity.

Vehicle/Equipment Maintenance

Should additional transport vehicles be purchased and positioned in Peshawar as recommended above, additional facilities should be provided at Peshawar to include:

- Additional warehouse space is recommended to accommodate parts for U.S. source/origin vehicles not presently in the ACLU inventory.
- Additional space for assembly and dispatch of convoys should be sought. The total ground area of the compound is not adequate for dispatching convoys from the existing fleet, and will be severely deficient for handling an additional 100 trucks.
- A total of 10 additional truck-service bays should be constructed to accommodate the expanded fleet.

In addition, a suitable facility for maintenance, warehousing and dispatching should be sought in or near Quetta for the 100 vehicles that are recommended for stationing there. First and second echelon maintenance services should be included.

It is strongly recommended that an in-depth study be performed to determine how best to assist the Afghan private sector with vehicle maintenance inside Afghanistan. In particular, the feasibility of establishing a series of modestly equipped maintenance stations and/or wrecker trucks along selected penetration routes (and possibly later along primary roads) should be examined. Maintenance centers located at border points and/or secure locations inside might be stocked with the parts needed to repair the Mercedes and International trucks that are prevalent. Such a study should address a number of issues, including the degree to which truckers are likely to use such facilities, routes to be serviced, kinds and quantities of parts that should be stocked, pricing issues, possible ACLU involvement and whether it would be possible to induce entrepreneurs to operate the facilities through subsidies or initial capitalization.

Technical Assistance

Construction

A civil engineer should be added to the CCSC staff whenever entry of U.S. expatriates to Afghanistan is permitted and the volume of construction activities warrants this assignment. An Afghan-American who is prepared to travel extensively would be best suited for this position.

Arrangements were made in early July to obtain the services of a technical representative of the Bailey bridge supplier to assist with training the ACLU crew at Arundu. The urgent need for this assistance is confirmed.

Additional technical support should be provided to both of the ACLU construction crews. The crews should also be allowed greater independence after they submit work plans.

Vehicle/Equipment Maintenance

A short-term warehouse/parts specialist is urgently needed to organize the ACLU warehouse and gain control of the inventory. This specialist should also organize the bench workshop and truck bays to ensure their efficient operation. The position should become permanent when the ACLU fleet is expanded as recommended herein.

As noted elsewhere, specifications have already been prepared for new four-wheel drive trucks. These vehicles will be of U.S. source/origin. **As an integral part of the procurement process, arrangements should be made for the manufacturers' specialists to provide training in critical operation and maintenance areas.** Arrangements have recently been completed for Hino representatives to provide this training for the trucks already on hand.

Procurement

One of the alternative actions listed below should be taken in order to address ACLU procurement problems:

- Assign responsibility for all in-country procurement to the ACLU or provide an experienced Pakistani on the CCSC staff to work closely with and to train the ACLU staff.

- Assign a qualified person from the RONCO staff to Peshawar to do the Pakistani procurement and to train ACLU staff in local procurement.

Data Management

A local administrative assistant should be added to the CCSC team for training and supervision in word processing, data base and spreadsheet operations. It is fairly urgent the recently arrived computers be used fully to assist with inventory and accounting work.

ACLU Organization/Management

As planned earlier, an **ACLU Steering Committee should be formed in the near future, with representation from the AIG Ministry of Reconstruction, Parties, GOP, O/AID/REP and CCSC.**

In addition, **the CCSC team should prepare written procedures, based on policies established by the Steering Committee.** The Financial/Administrative Officer would seem to be a logical choice for preparation of a Procedures Manual.

It is recommended that CCSC seek to arrange internships or short observational tours for key ACLU managers in the United States. It may be possible to identify comparable transport and construction organizations that would be capable of and interested in participating in such a program. Large moving companies, produce shippers and others that operate and maintain their own truck fleets might be able to arrange meaningful experiences.

VII. FINANCIAL PLAN

The estimated costs for implementing each of the recommendations of Section VI are given on the following three pages.

Under the category "Transport and Maintenance", estimates for expansion of staff and facilities at Peshawar and Quetta were obtained, in part, by prorating earlier CCSC estimates for Peshawar on the basis of numbers of cargo trucks to be accommodated.

Costs of maintenance facilities inside Afghanistan cannot, of course, be estimated accurately until the results of the recommended feasibility study are in. The figures given indicate order of magnitude only.

Under "Construction", the addition of two construction crews has been phased over a two-year period, recognizing that more experience is needed with the operation of these crews before incurring large expenditures.

The financial plan indicates estimated costs for expansion items only. To these must be added the costs of present ACLU and CCSC operations.

Table II

FINANCIAL PLAN FOR EXPANSION OF THE ACLU

Line	Item	Year 1	Year 2	Total
TRANSPORT AND MAINTENANCE				
1.	200 trucks, 7 ton, 4x4 @ $45,000 ea	9000000		9000000
2.	30 pickup trucks, 3/4 ton, 4x4 @ 15,000 ea	450000		450000
3.	100 wagon-trailers, 7-10 ton @ $6,000 ea	600000		600000
4.	Original spares for trucks, pickups and trailers @ 15%	1508000		1508000
5.	Local spares for trucks, pickups and trailers @ 15%	754000	754000	1508000
6.	Expansion of staff and facilities at Peshawar for 100 additional trucks:			
	Salaries (328 add'l staff)	558000	586000	1144000
	Rent--add'l ground	15000	15000	30000
	Const of whse & serv bays	20000		20000
	Tools/equip/materials	120000	120000	240000
	POL (75,000 km/vhcl/yr)	578000	578000	1156000
	Food and lodging	260000	260000	520000
	Other	150000	150000	300000
	Totals:	1701000	1709000	3410000
7.	New dispatch and maintenance facility at Quetta:			
	Salaries (328 employees)	558000	586000	1144000
	Rent/utilities	15000	15000	30000
	Construction	40000	10000	50000
	Tools/equip/materials	120000	120000	240000
	POL (75,000 km/vhcl/yr)	578000	578000	1156000
	Food and lodging	260000	260000	520000
	Other	150000	150000	300000
	Totals:	1721000	1719000	3440000
8.	Maintenance facilities inside Afghanistan	750000	1000000	1750000
9.	Total Transport & Maintenance:	16484000	5182000	21666000

FINANCIAL PLAN FOR EXPANSION OF THE ACLU (Continued)

Line Item	Year 1	Year 2	Total
CONSTRUCTION			
1. 6 crawler-tractors (D8 size) for two existing teams @ $110,000 ea	660000		660000
2. 10 dump trucks, 10 ton, 4x4 for two existing teams @ $50,000 ea	500000		500000
3. Two additional road-improvement crews, equipped and staffed same as first two crews (add one team each year):			
Equipment	1330000	1330000	2660000
Salaries (161 employees)	144000	302000	446000
Materials	400000	800000	1200000
Casual labor	200000	400000	600000
Transportation	30000	60000	90000
POL	150000	300000	450000
Food and lodging	99000	197000	296000
Other	90000	180000	270000
Totals:	2443000	3569000	6012000
4. De-mining capability for four const crews at $20,000 ea	60000	80000	140000
5. Two bridge-repair crews:			
Equipment	500000		500000
Materials	240000	240000	480000
Salaries (50 employees)	89000	94000	183000
Casual labor	60000	70000	130000
Transportation	30000	30000	60000
POL	30000	30000	60000
Food and lodging	61000	61000	122000
Other	60000	60000	120000
Totals:	1070000	585000	1655000
Total Construction:	4733000	4234000	[illegible]67000

Line Item	Year 1	Year 2	Total
TECHNICAL ASSISTANCE			
1. Long-term assignment of civil engineer for supervision of road-improvement activities	175000	175000	350000
2. Long-term assignment of parts specialist	175000	175000	350000
3. Short-term assignment of trainers for O&M of new trucks (3 person-months)	40000		40000
4. Short-term assignment of specialist for development of plan for vehicle maintenance inside Afghanistan (1.5 person-months)	20000		20000
5. Assignment of local procurement specialist	10000	11000	21000
6. Assignment of local admin assistant for data management	10000	11000	21000
Total Technical Assistance:	430000	372000	802000
ACLU ORGANIZATION/MANAGEMENT			
1. Observational tours in US for key managers. 10 tours/year @ $8,000	80000	80000	160000
EXPANSION TOTALS:	21727000	9868000	31595000

APPENDIX A

SCOPE OF WORK

EXTRACT FROM DELIVERY ORDER # 3

AID CONTRACT NO. 306-0205-C-00-9385-00, AFGHAN STUDIES PROJECT

INTRODUCTION

The Afghan Construction and Logistics Unit (ACLU) has been in existence for nearly a year. Its primary task has been to provide vehicles and drivers to carry humanitarian aid commodities into Afghanistan, to maintain and repair its own vehicles and those of other international assistance agencies, and to repair roads and bridges among major routes. In the future, it is anticipated that ACLU will be involved in rehabilitation of main roads and in construction and rehabilitation of feeder roads. O/AID/REP wishes to have a plan for the expansion of ACLU developed and elaborated.

ARTICLE I - TITLE

Expansion of the Activities of the Afghan Construction and Logistics Unit.

ARTICLE II - OBJECTIVE

The objective of this Delivery Order will be to review and elaborate a plan for expanding the Afghan Construction and Logistics Unit. The work will include a description of key positions and staff size, needed facilities and equipment, budgetary estimates, and targeted service capacities for the expanded organization. Origins/destinations of commodities presently transported by ACLU will be identified. Increases in staff size, equipment and facilities, and budget will be compared with order-of-magnitude projections of needs for ACLU services over the next two years. This Delivery Order will not deal with issues of the ultimate organizational destiny of ACLU (e.g. as an element of a Ministry of Works or as the temporary repository for functions which are to be spun off to the private sector later).

ARTICLE III - SCOPE OF WORK

The Contractor shall carry out the five principal tasks and several subtasks as follows:

1. Review and provide a commentary on a plan for the operation of the ACLU, as set out in its authorizations.

2. Review the current operations of ACLU including current activity levels, equipment, staff and budgetary resources.

3. Prepare estimates of volume, value, origin, and destination of commodities carried by ACLU since its inception.

4. Make recommendations for the next two years concerning:

   a. Appropriate staffing levels;

   b. New key positions required;

   c. Additional equipment required (including general performance specifications); and

   d. Additional technical assistance needed.

5. Make order of magnitude projections of demand for ACLU services over the next two years. These projections should be provided on a mini-max basis. These projections are to serve as benchmarks of the reasonableness of the proposal expansion of the ACLU capabilities rather than as a comprehensive set demand forecasts for the resettlement period.

APPENDIX B

LIST OF PERSONS INTERVIEWED

PERSONS INTERVIEWED

ACLU Study
Gibson/Griffiths

Name	Position/Agency
Bijleveld, Anne-Willem	UNHCR
Boardman, Gerald	UNO
Cushing, Henry	O/AID/REP
da Silva, Ramiro Lopes	UNILOG
Eighmy, Beverly	O/AID/REP
English, Richard	Consultant
Garner, David	Consultant
Habib	Transport Supervisor, ACLU
Jan, Mohammed	Driver, ACLU
Kane, Meri Lee	UN Coordinator
Karim, Engineer Mohammed	General Superintendent, ACLU
Klaasmeyer, John	ACLU Consultant
Mohammed, Lal	Driver, ACLU
Mahan, Val	O/AID/REP
McGovern, Michael	O/AID/REP, START
Mobin	Convoy Manager, ACLU
Najimi, Engineer Abdul Ali	Assistant General Superintendent, ACLU
Oldham, William	MSH
Qayoom, Abdul	Driver, ACLU
Rahmanzai, Moqim	UNO

Rashid, Ibrahim	Private Trucker
Schuler-Repp, Jane	UNHCR
Scott, George	COP, CCSC
Sediq, Engineer Mir Mohammed	VITA
Shafradin	Convoy Manager, ACLU
Shah	Assistant Maintenance Superintendent, ACLU
Winslow, James	CCSC

PN-ABF-753

Final Report

Expansion of the Activities of the Afghan Construction and Logistics Unit

Volume II

Submitted to the

Office of the A.I.D. Representative for Afghanistan Affairs

Under

Delivery Order No. 3, Contract No. 306-0205-C-00-9385-00

December 1989

Submitted by

Robert R. Nathan Associates, Inc. and Louis Berger International, Inc., A Joint Venture

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PREFACE

This report was prepared in response to Delivery Order No. 3 of A.I.D. Contract No. 306-0205-C-00-9385-00, The Afghanistan Studies Project. This contract is a joint venture between Robert R. Nathan Associates, Inc. and Louis Berger International, Inc. The field work, extending over the period June 23 through July 16, 1989, and preparation of the draft report were performed by a team consisting of Dr. Richard E. Gibson and Dr. William H. Griffiths, both employed by Louis Berger International Inc. Mr. Harvey Lerner and Ms. Barbara Phillips contributed home office technical backup and report drafting and preparation assistance to the project.

The report is presented in two volumes. The first volume (Volume 1) presents an institutional analysis of ACLU. The present volume (Volume 2) contains a technical analysis of the Afghan transportation system.

I. INTRODUCTION

The purpose of this section of the report is to present rough estimates of the total demand for cargo transport services in support of refugee repatriation over the next few years, and more specifically to estimate the demand for ACLU transport services. The demand will depend on a number of factors, including the following:

1. the rate of repatriation;
2. the volumes of commodities to be transported;
3. the destinations of the commodities within Afghanistan, and
4. the competitive position of ACLU compared with other truck operators.

There is a high degree of uncertainty regarding all of these factors and sufficient data for a rigorous analysis are not available. However, some rough estimates regarding the tonnages of commodities to be transported and the probable destinations of the returning refugees are available. The approach adopted under these circumstances was to establish a system of analysis which would require a relatively full set of data inputs, and to use the available data plus a number of assumptions to operate the system and arrive at preliminary conclusions. This approach has a number of advantages: it provides preliminary conclusions on the basis of the available data; it requires that all assumptions be stated explicitly; it permits the testing of different assumptions regarding commodity volumes, road conditions, vehicle utilization, etc., and the analysis can be easily updated and rerun as more data become available.

The analysis was carried out as a series of matrices on relatively simple LOTUS 123 spreadsheets using an IBM PC-compatible computer. A set of instructions for the use of the system and acquisition of the system on computer disks is included in Appendix III to this volume.

II. METHOD OF ANALYSIS

The analysis of transportation demand and truck capacity requirements was carried out in the following steps:

1. forecast of the total volume of shipments, in tons;

2. estimates of the number of returning refugees by province;

3. estimates of the distribution of the commodities, by province of destination;

4. preparation of a cargo origin-destination (O-D) matrix, showing the estimated tonnage to be transported between each O-D pair;

5. preparation of a road distance matrix, showing the estimated distance, on primary and secondary roads, between each O-D pair;

6. estimates of the average truck capacity, in tons per truck, between each origin-destination pair;

7. estimation of the number of vehicle trips required between each O-D pair, on the basis of the data in Steps 4 and 5;

8. preparation of a road trip-time matrix showing the estimated time in days for a two-way trip between each O-D pair;

9. estimates of the total vehicle kilometers and vehicle days required to carry the forecast tonnage between each O-D pair;

10. estimates of the total vehicle fleet required to carry the forecast cargo, and

11. estimate of the total existing vehicle fleet which will be available to carry the cargo.

The details of each step are explained in the following sections.

III. FORECAST VOLUME OF SHIPMENTS

3.1 Introduction

The shipments are expected to cover the needs of the rural areas, including not only the returning expatriate refugees but also the displaced persons who remained within Afghanistan and those who did not move at all, but who were still affected by the conflict. The initial forecast represents the total estimated tonnage to be transported in each year of an assumed two-year period of major repatriation, regardless of who carries out the transportation operation. It is also possible that a similar or possibly somewhat lower level of support will still be required following the years in which the actual repatriation takes place, depending on the rate of return to self-sufficiency in the areas involved.

3.2 Sources and Forecasts

The forecasts are based primarily on the information derived from three published sources and one interview, as follows:

1. United Nations, "Operation Salam, United Nations Plan of Action, Geneva, March 1989.

2. UNHCR/WFP; Lindauer, G. et. al.,"Project Market Place", 1989.

3. Office of the United Nations Co-ordinator for Humanitarian and Economic Assistance Programmes Relating to Afghanistan, "First Consolidated Report", Geneva, September 1988.

4. Interview, Mr. Ramiro Lopes da Silva, UNILOG, 26 June 1989.

A worksheet showing the estimates obtained from the four sources, and the volumes selected for this forecast, is shown in Volume II, Appendix I, Table A 1-1. These sources were supplemented by discussions with a number of people familiar with the many aspects of the refugee situation. The persons interviewed during the course of the study are listed in Volume I, Appendix B. In general, in cases where there were differences among the sources, the larger estimates were selected for this forecast. The resulting forecast of commodity shipments, with a total volume of 2,077,000 tons per year over each year of the period of major repatriation and rehabilitation, is shown in Table 1.

It is emphasized that this forecast is based on preliminary estimates from a number of sources. It has a relatively high degree of uncertainty, which is essentially inherent in the nature of the conflict and the refugee situation. It should be reviewed to ensure that the existing information has been interpreted correctly, and should be updated as additional information becomes available. It should be viewed primarily as a starting point for a continuing analytical process.

IV. DISTRIBUTION OF SHIPMENTS BY PROVINCE

As shown above, a number of organizations have made preliminary estimates of the volumes of commodities they might transport to Afghanistan for support, rehabilitation and reconstruction during and after a major repatriation of refugees. However, there is almost no information regarding the planned destinations of the commodities within Afghanistan or the volumes planned for each destination. Under these circumstances, estimates have been made for this study based on the estimated number of refugees originating in each province of Afghanistan. It is assumed as a first approximation that, given a total estimated volume of commodities, the share of the total destined for each province will be approximately proportional to the percentage of the total refugees originating in that province.

TABLE 1: ESTIMATED ANNUAL COMMODITY SHIPMENTS

Commodity	Tons per Year
Wheat	500000
Fertilizer	150000
Rice	900
Oil	40000
Dried Milk	7300
Pulses	3000
Sugar	17400
Tea	1700
Seed	60000
Oxen (1)	330000
Tools	1000
Tractors (2)	10000
Insecticide	100
Tree Seedlings (3)	4200
Construction Material (4)	200000
Drugs & Medicines	1000
Diesel	600000
Kerosene	100000
Other (4)	50400
Total	2077000

Notes:

Tonnages are based on data in Volume II, Appendix I, Table A 1-1.

(1) Equivalent tons for truck capacity based on 100,000 pair at 3 pair per 10-ton truck.

(2) Based on 2000 tractors at an average of 5 tons per tractor.

(3) Based on 21 million seedlings at 5 seedlings per kilogram.

(4) Arbitrary estimate.

Tonnages represent the estimated volumes to be transported to Afghanistan during each year of the period of major repatriation and rehabilitation.

Estimates of the number of refugees by province were obtained from a United Nations High Commission for Refugees (UNHCR) study published in 1988 (Source 1).[1] The estimates are shown in Table 2, Columns 1 through 7. However, this publication indicates only those refugees located outside of Afghanistan, while the needs in any given area would be best indicated by the total number of refugees, including those who relocated within Afghanistan (estimated at more than two million persons). Estimates of the absolute numbers of such refugees are not available, but estimates showing the percentages of refugee families from selected villages who relocated inside and outside of Afghanistan are available in a UNHCR paper dated June 1989 (Source 2).[2] The paper, based on a survey of refugees living in Pakistan, also provides information on the number of households destroyed, changes in the numbers of oxen and tractors, and changes in the areas cultivated.

The estimates of refugees derived from Source 2 are shown in Table 2, Columns 8 through 10. However, representatives of the agency which produced this paper emphasize that it was not possible to construct a statistically-designed sample under the circumstances of the survey, and that the respondents to the survey might tend to overstate the number of refugees as percentages of the population to some extent. A comparison of the two sources indicates considerable differences in many of the cases where comparisons can be made. In general, if the data were consistent, the total refugees as a percentage of the provincial populations shown in Source 1 (Column 6), which includes only those refugees located outside of Afghanistan, should correspond more or less with the percentage of families moved to "outside" shown in Source 2 (Column 9). However, even very rough correspondence is found in only about 30 percent of the cases, and there are large differences in many of the remaining cases. The uncertainty regarding internally-displaced refugees is further indicated by a 1988 report: "Information on their present place of abode, area of origin as well as the numbers involved is not available."[3] Under these circumstances, the distribution of commodities by province in the initial run of the analysis was based entirely on the estimates of externally-located refugees shown in Source 1. The resulting distribution of the commodities is shown in Table 3.

The estimated road distance between each O-D pair is shown in Table 4, with the distances shown separately for the parts of each trip on primary and secondary roads. The Province Centers were used as the centroids for the measurement of the distance to each province. The road distances were derived from the Nelles Verlag map of Afghanistan, which shows the distances between major communities. Other distances were measured from the map, which is at a scale of 1:1500000. The shortest distance which made

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[1] English, Richard: "Preliminary Report on Conditions Affecting the Repatriation of Afghan Refugees"; Geneva, June 20, 1988.

[2] UNHCR, "Population and Household Destruction in Afghanistan From Survey of Refugees Living in Pakistan", 27 June 1989.

[3] Office of the United Nations Co-ordinator for Humanitarian And Economic Assistance Programmes Relating to Afghanistan, "First Consolidated Report", Geneva, September 1988, p. 53.

TABLE 2: ESTIMATED REFUGEES BY PROVINCE OF ORIGIN

	PROVINCE	Est. Pop'n, 1978 (000)	Refugees by Province of Origin, 1987/88 NWFP	Bal'n	Punjab	Iran	Total Refugees (000)	Total as % of Prov. Pop'n.	Total as % of Refugee Pop'n.	Percent of Families Moved from villages Inside	Outside	Total
		(1)	(2)	(3)	(4)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
N	1 Balkh	569	2	5	6		13	2.3	0.3	9	9	18
	2 Fariab	588					NA			14	5	19
	3 Jawzjan	589			7		7	1.2	0.2	17	38	55
	4 Samangan	273	4	5	6		15	5.5	0.4	0	49	49
NE	5 Badakhshan	498	28				28	5.6	0.7	20	17	37
	6 Baghlan	494	52	5	47		104	21.1	2.7	6	5	11
	7 Kunduz	555	30	5	41		76	13.7	2.0	20	45	65
	8 Takhar	520		5			5	1.0	0.1	13	20	33
E	9 Kunar	250	223				223	89.2	5.9	3	81	84
	10 Laghman	811	223				223	27.5	5.9	12	70	82
	11 Nangrahar	746	389		10		399	53.5	10.5	3	71	74
	12 Paktia	498	314	16	19		349	70.1	9.2	4	88	92
EC	13 Bamyan	269					NA					
	14 Ghazni	647	264	96			360	55.6	9.5	56	8	64
	15 Kabul	1319	56		13		69	5.2	1.8	36	58	94
	16 Kapisa	346					NA			92	8	100
	17 Logar	258	262	21			283	109.7	7.4	3	57	60
	18 Parwan	410	48		5		53	12.9	1.4	77	17	94
	19 Wardak	288		9			9	3.1	0.2	9	26	35
S	20 Helmand	518		135		20	155	29.9	4.1	21	61	82
	21 Kandahar	567	1	463	2		466	82.2	12.3	8	87	95
	22 Nimroz	104		17		100	117	112.5	3.1	4	93	97
	23 Paktika	245	266		2		268	109.4	7.1	7	79	86
	24 Uruzgan	444		11		40	51	11.5	1.3	44	3	47
	25 Zabul	179	1	48			49	27.4	1.3	18	47	65
NW	26 Badghis	234		3		40	43	18.4	1.1	41	8	49
	27 Farah	225				200	200	88.9	5.3	10	68	78
	28 Ghor	388		3		40	43	11.1	1.1	19	52	71
	29 Herat	769				192	192	25.0	5.1	5	23	28
	TOTALS	13601	2163	847	158	632	3800	27.9	100.0			

Sources:

Columns 1 to 7: derived from English, Richard,"Preliminary Report on Conditions Affecting the repatriation of Afghan Refugees", prepareed for the United Nations High Commissioner for Refugees, 20 June 1988. Number of refugees does not include an estimated 300,000 unregistered refugees. Provinces shown as NA have only small numbers of external refugees (from discussion with R. English).

Columns 8 to 10: UNHCR, "Population and Household Destruction in Afghanistan From Survey of Refugees

TABLE 3: DISTRIBUTION OF COMMODITIES BY PROVINCE

		COMMODITIES: TONS (000)				
	DESTINATIONS	Wheat	Fert-ilizer	Other Dry	Fuel	TOTALS
N	1 Balkh	1.7	0.5	2.5	2.4	7.1
	2 Fariab	0.0	0.0	0.0	0.0	0.0
	3 Jawzjan	0.9	0.3	1.3	1.3	3.8
	4 Samangan	2.0	0.6	2.9	2.8	8.2
NE	5 Badakhshan	3.7	1.1	5.4	5.2	15.3
	6 Baghlan	13.7	4.1	19.9	19.2	56.8
	7 Kunduz	10.0	3.0	14.5	14.0	41.5
	8 Takhar	0.7	0.2	1.0	0.9	2.7
E	9 Kunar	29.3	8.8	42.7	41.1	121.9
	10 Laghman	29.3	8.8	42.7	41.1	121.9
	11 Nangrahar	52.5	15.8	76.3	73.5	218.1
	12 Paktia	45.9	13.8	66.8	64.3	190.8
EC	13 Bamyan	0.0	0.0	0.0	0.0	0.0
	14 Ghazni	47.4	14.2	68.9	66.3	196.8
	15 Kabul	9.1	2.7	13.2	12.7	37.7
	16 Kapisa	0.0	0.0	0.0	0.0	0.0
	17 Logar	37.2	11.2	54.1	52.1	154.7
	18 Parwan	7.0	2.1	10.1	9.8	29.0
	19 Wardak	1.2	0.4	1.7	1.7	4.9
S	20 Helmand	20.4	6.1	29.7	28.6	84.7
	21 Kandahar	61.3	18.4	89.2	85.8	254.7
	22 Nimroz	15.4	4.6	22.4	21.6	63.9
	23 Paktika	35.3	10.6	51.3	49.4	146.5
	24 Uruzgan	6.7	2.0	9.8	9.4	27.9
	25 Zabul	6.4	1.9	9.4	9.0	26.8
NW	26 Badghis	5.7	1.7	8.2	7.9	23.5
	27 Farah	26.3	7.9	38.3	36.8	109.3
	28 Ghor	5.7	1.7	8.2	7.9	23.5
	29 Herat	25.3	7.6	36.7	35.4	104.9
	TOTALS	500	150	727	700	2077.0

Distribution based on number of external refugees from each province.

TABLE 4: ROAD DISTANCES (KMS.)

	Province	Center	1 Peshawar			2 Quetta		
			Primary	Secondary	Total	Primary	Secondary	Total
N	1 Balkh	Mazar-e-Sh.	702		702	1137		1137
	2 Fariab	Maymana	850	205	1055	792	455	1247
	3 Jawzjan	Sheberghan	850		850	1285		1285
	4 Samangan	Samangan	583		583	1332		1332
NE	5 Badakhshan	Faizabad	585	230	815	1020	230	1250
	6 Baghlan	Baghlan	535		535	970		970
	7 Kunduz	Kunduz	615		615	1050		1050
	8 Takhar	Taloqan	585	72	657	1020	72	1092
E	9 Kunar	Asadabad	131	92	223	858	92	950
	10 Laghman	Mehterlam	155	22	177	830	22	852
	11 Nangrahar	Jalalabad	131		131	858		858
	12 Paktia	Gardaiz	347	81	428	648	81	729
EC	13 Bamyan	Bamyan	351	160	511	778	160	938
	14 Ghazni	Ghazni	411		411	578		578
	15 Kabul	Kabul	277		277	712		712
	16 Kapisa	Mahmud Raqi	207	65	272	766	35	801
	17 Logar	Puli Alam	277	65	342	648	30	678
	18 Parwan	Charikar	341		341	778		778
	19 Wardak	Maydan Shar	307	10	317	682	10	692
S	20 Helmand	Lashkargah	879	45	924	350	45	395
	21 Kandahar	Kandahar	759		759	230		230
	22 Nimroz	Zaranj	879	342	1221	350	342	692
	23 Paktika	Sharan	411	65	476	578	65	643
	24 Uruzgan	Tarin Kot	411	340	751	230	145	375
	25 Zabul	Qalat	629		629	360		360
NW	26 Badghis	Qala Nau	1321	138	1459	792	138	930
	27 Farah	Farah	1147	75	1222	613	75	688
	28 Ghor	Chaghcharan		744	744	792	361	1153
	29 Herat	Herat	1321		1321	792		792

Notes:

1. Provincial capitals used as provincial centroids.
2. Distances represent shortest route between points with maximum use of primary roads.
3. Distances are approximate.

Source: Nelles Verlag map of Afghanistan, Munich, 1988.

maximum use of the primary roads was used in each case, which implies that the roads will be at least passable, and that access to them will not be hindered, at the time that the major repatriation takes place. Thus, there is a basic assumption that the transport situation will be moderately improved at that time.

V. TRANSPORTATION ANALYSIS

5.1 Introduction

Steps 4 through 10 listed under "Method of Analysis" above were carried out in a series of spreadsheet matrices. Three runs of the analytical system were made to test different assumptions regarding the distribution of the cargo to the provinces, and the addition of a second point of origin for the cargo. The inputs used and the results of the three runs are shown in Volume II, Appendix II in three series of tables: Tables 1-1 through 1-10 (Run 1); Tables 2-1 through 2-10 (Run 2) and Tables 3-1 through 3-10 (Run 3).

5.2 Analysis Run 1

Run 1 is based on the assumptions that the volume of commodities shipped will total 2.077 million tons per year (as shown in Table 1); the distribution to the provinces will be in proportion to the external refugees from each province (as shown in Table 2, Column 7), and that all shipments will originate in Peshawar. It is further assumed that the average capacity per truck will be 10 tons on primary roads and 5 tons on secondary roads; that the average kilometers per day per operating truck will be 400 and 200 kilometers respectively, and that the average availability of the vehicles (i.e. percentage of the time available for operation) will be 60 percent for trucks operated on primary roads and 40 percent on secondary roads.

The run parameters for each run are shown in a box at the beginning of the series of tables for each run. The vehicle parameters (capacity, daily kilometers and availability) were selected on the basis of interviews with a small number of truck operators. Again, it is emphasized that these are rough approximations which should be checked and updated from time to time. However, the computerized analytical system permits the testing of different assumptions and the updating of the data with minimum effort.

The tables for Run 1 are as follows:

Table 1-1: Refugees by Province. This shows the distribution of external refugees, which is the basis for the distribution of the commodities to the provinces in this run.

Table 1-2: Distribution of Commodities by Province. Shows the estimated tonnage of commodities to each province based on the percentages of external refugees.

Table 1-3: Cargo by Origins and Destinations. In this run, it is assumed that all cargo originates in Peshawar, with destinations as shown in Table 1-2.

Table 1-4: Road Distances. Shows the estimated road distance between each O-D pair, with the distances shown separately for the parts of each trip on primary and secondary roads. Peshawar is shown as the only originating point in Run 1.

Table 1-5: Vehicle Capacity. As noted previously, vehicle capacity was assumed to be 10 tons per vehicle on primary roads and 5 tons on secondary. This table consists of weighted average capacities derived from the road distances between each O-D pair and the proportion of the distance on primary and secondary roads in each case, as shown in Table 1-4. The capacities reflect the effects of road conditions and truck size. Different assumptions can be tested by simply changing the value of this parameter in the Run Parameter box.

Table 1-6: Vehicle Trips Required. This table is derived from the tons of cargo between each O-D pair (Table 1-3) and the vehicle capacities on the route from origin to destination (Table 1-5).

Table 1-7: Trip Time. The trip times are a function of the assumed kilometers per day on primary and secondary roads (400 and 200 respectively), the distance between each O-D pair, and the proportion of the distance on primary and secondary roads. The total times are somewhat understated as they include only running time, without allowance for unloading and other delays.

Table 1-8: Vehicle Kilometers. This is a product of the vehicle trips (Table 1-6) and the distances between each O-D pair (Table 1-4).

Table 1-9: Vehicle Days. This is a product of the vehicle trips (Table 1-6) and the trip time in days between each O-D pair (Table 1-7).

Table 1-10: Vehicles Required. This is a function of the assumed vehicle availability (60 percent on primary roads and 40 percent on secondary) and the total vehicle days required to carry the annual cargo between each O-D pair.

5.3 Analysis Run 1 Results

The results of Run 1 indicate a requirement for a total of approximately 221,500 vehicle trips, 251 million vehicle kilometers, 700,000 vehicle days and a fleet of about 3,400 vehicles. This assumes an even distribution of transport throughout the year, so the actual vehicle requirement will be somewhat higher to accommodate the peak period. If the peak quarter is assumed to account for one-third of the annual total, the requirement would be for about 4500 vehicles.

5.4 Analysis Run 2

Run 2 is the same as Run 1 in all respects except for the distribution of wheat and fertilizer among the provinces. As shown in Appendix I, Table A 1-1, the First Consolidated Report of the UN Co-ordinator provided more specific information on the possible distribution of these two commodities than was available for the other

commodities. This information indicates that wheat will not be transported to the North and Northeast Regions but that there will be deficits in the other regions. Similar but less specific information is provided for fertilizer. While the Run 1 distribution on the basis of the origins of externally-located refugees has the advantage of applying a consistent criterion to all provinces and commodities, it is probable that the use of the additional information on wheat and fertilizer requirements will result in a less inaccurate estimate of transport requirements. The differences in the distribution patterns for wheat and fertilizer can be seen by comparing Table 1-2 (Run 1) with Table 2-2 (Run 2).

5.5 Analysis Run 2 Results

The results of Run 2 indicate an annual requirement for a total of approximately 221,200 vehicle trips, 241 million vehicle kilometers, 674,000 vehicle days and a fleet of about 3,300 vehicles (not including an increase of about one-third to account for peaking). The results in terms of all four measures are within four percent of the Run 1 results, indicating that the analysis is not particularly sensitive to small changes in the distribution pattern of a given volume of commodities. However, the Run 2 distribution is considered the more representative of the two and will be used as the basis for comparison with Run 3.

5.6 Analysis Run 3

Run 3 is the same as Run 2 in all respects except that, instead of assuming Peshawar to be the only origin, Quetta is added as a second origin. Commodities are assumed to originate in Quetta rather than Peshawar in those cases where Quetta provides a shorter distance from origin to destination. The differences in routing resulting from this assumption can be seen by comparing the cargo origins in Table 2-3 (Run 2) with those in Table 3-3 (Run 3).

5.7 Analysis Run 3 Results

The results of Run 3 indicate a requirement for a total of approximately 222,600 vehicle trips, 177 million vehicle kilometers, 510,000 vehicle days and a fleet of about 2,450 vehicles (3260 vehicles when adjusted for peaking). The vehicle trips are within one percent of those in Run 2, as would be expected given the same total tonnage and similar truck capacities. However, the other requirements are significantly lower than in Run 2. The vehicle kilometers required are reduced by about 27 percent; vehicle days by 24 percent and vehicle fleet by about 25 percent.

5.8 Other Analysis Runs

Additional runs were made to test the effects of varying the numerical parameters shown in the parameter box at the beginning of each analysis run. In all cases, as would be expected, the vehicle fleet requirements varied in direct or inverse proportion to the variation in the determining parameter. For example, if the average kilometers per day are reduced from 400 to 200 on primary roads and from 200 to 100 on secondary roads (which may be more representative for an interim period between the current situation and the

improved situation assumed earlier), the vehicle requirements would increase from 2,450 to 4,900, plus an additional one-third for peaking. Thus, if only one parameter is changed in a particular test, the results in terms of vehicle fleet requirements can be derived directly, without an additional run of the analysis system.

VI. VEHICLE FLEET ESTIMATES

Estimates of the existing and planned vehicle fleets were available from a number of sources. There was a high degree of consistency among the estimates from the various sources. In the cases of the fleets outside of Pakistan and some within Pakistan, this could indicate a reasonable degree of reliability, or possibly the simple repetition of a single estimate which has gained general currency. The estimates are summarized in Table 5.

The estimates indicate an available fleet of about 11,100 vehicles of different sizes. When pickup trucks and trailer capacity (which is planned by UNILOG but not yet obtained) are excluded, the capacity totals approximately 172,000 cargo tons, equivalent to about 17,200 10-ton trucks (ACLU accounts for less than half of one percent of the total). This compares with an estimated requirement of about 2,450 ten-ton vehicles shown in Table 3-10 (and increased to 3,260 to allow for pealing) for repatriation support transportation needs. Thus, by these estimates, repatriation support would absorb about 19 percent of the available fleet.

The full balance between the demand for and supply of transport capacity cannot be estimated in the absence of information on the probable non-refugee demand within Afghanistan following the return to a more normal situation. In general, there appears to be a strong consensus that the capacity will be adequate to meet the demand. Under these circumstances, there would not appear to be a strong case for supplementing the ACLU fleet on the basis of an anticipated shortfall in capacity, especially considering the very small part of the total capacity now supplied by ACLU.

Two major conclusions can be drawn from the analysis:

1. There is not a strong case for increasing the ACLU fleet on the basis of an anticipated shortfall in vehicle capacity.

2. There are significant savings in vehicle requirements through the use of Quetta as a major origin of the commodity shipments.

This analysis was limited to the objective of estimating the possible demand for cargo transportation services in support of refugee repatriation over the next few years, and more specifically to estimating the demand for ACLU transport services. However, the forecast of transportation demand, whether at the level forecast here or considerably higher or lower, is not the critical factor in determining the appropriate capacity of ACLU. The organization could attract enough traffic to fully utilize a fleet with many times the capacity of its existing fleet as long as its tariffs were at a competitive level, either through efficient

TABLE 5: VEHICLE FLEET ESTIMATES

	Trucks 21-30T	Trucks 20 T	Trucks 7-19T	Trucks < 7 T	Total Trucks	Sources & Comments
Commercial Fleet Based in Afghanistan	2000	2000	1000	?	5000	ACLU staff. Mostly => 20 T. About 60% are 1975-80 Mercedes. Mr. Ibrahim Rashid (truck operator) says there are about 5000 Afgn.trucks in Pakistan and more than 5000 in Afghanistan.
Afghan Fleet Based in Pakistan	200	300	2500	1000	4000	ACLU staff. On good roads, may load 30 tons. 500 are => 20 T. 3500 are 7T, pickups, etc.
ACLU			80	20	100	ACLU. Fleet of 80 to 86 7-T trucks and 20 pickup trucks.
UNILOG	150				150	UNILOG. Will rely mainly on commercial truckers. This fleet to "respond to critical needs". 150 trucks to be acquired, plus trailers - could almost double capacity on good roads.
USSR (Based at Termuz)		1500			1500	UNILOG. 1500 is USSR target. Now have about 700 +.
Parties (AIG)		?	160	200	360	ACLU (partial count only).
	2350	3800	3740	1220	11110	
Est. capacity with post-war roads and access (Tons of capacity)	58750	76000	37400	2440	174590	

(Not counting pickups or trailer capacity, this is equivalent to about 17,200 10-ton trucks).

operation or through subsidy. The fleet requirements are more a function of the role to be played by ACLU, and an analysis of the general transport demand and supply situation alone is not an adequate basis for consideration of the future role of ACLU. Additional factors are discussed in the following sections.

VII. ACLU INFLUENCE ON TRANSPORT TARIFFS

7.1 Introduction

Although there appears to be a consensus that ACLU cargo capacity will not be an important factor in terms of the total requirement for transport capacity, it has been suggested that the presence and possible expansion of the ACLU operation could have a favorable influence on the tariffs of the private trucking companies. A similar rationale has been applied to the planned UNILOG trucking operation. For this to be a valid factor, at least two conditions must be met:

1. The costs of ACLU must be sufficiently low that the ACLU charges would be in the same range as the costs of the private truckers, or alternatively, ACLU must subsidize the users of its service by charging less than its costs;

2. The capacity of ACLU must be sufficiently high that, if the private operators were to charge unnecessarily high rates, ACLU (or ACLU, UNILOG and possibly others in combination) could draw off enough of their business to cause them to reduce their rates.

7.2 ACLU Costs

ACLU is currently operating under extremely difficult conditions, especially in terms of the quality of the roads on which it must operate. As shown in Volume I, Section III, Table 1, the average round trip distance for ACLU vehicles is 1,048 kilometers and average time 8 days, for an average of only 131 kilometers per operating day. The average cargo per loaded truck is 5.6 tons. Assuming an average operating fleet of 80 trucks, the average truck productivity was about 2,570 kilometers per month, equivalent to only 31,000 kilometers per year. Total ton kilometers averaged only 81,000 per year per vehicle. In addition, these estimates are inflated in that part of the tonnage shown in Volume I, Table 1 was carried by non-ACLU trucks.

Accounting records showing the costs of ACLU were not available for analysis as part of this study, but the costs are undoubtedly high because of the conditions which result in this low truck productivity. Although the actual operating costs could not be analyzed, hypothetical costs have been developed using a vehicle operating cost model which is probably as reliable as any developed to this time.[4] The input parameters used in this

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[4]. World Bank, "Highway Design and Maintenance Model (HDM III); Vehicle Operating Cost Model", 1987.

application were established in consultation with ACLU staff to match the existing situation as closely as possible, but the model has not been calibrated to Afghanistan conditions, so the results should be considered as only roughly indicative. In addition, the results would tend to represent an "average" commercial trucking operation rather than the more specialized ACLU operation. Above all, it should be recognized that this type of abstract analysis is not an adequate substitute for a review and analysis of the actual accounting records of the organization. Such an analysis should be undertaken when the accounting system has been in operation for a sufficient length of time to provide reliable results.

The input parameters and the results (with costs in U. S. dollars) are shown in the two pages of Table 6. The table shows total vehicle operating cost of US$ 762 per 1,000 vehicle kilometers under current conditions. Using a conversion rate of PRs 20 = US$ 1, this is equivalent to Rs 15.24 per vehicle kilometer. Assuming an average load of 5 tons and an empty return haul, this is equal to about Rs 6.1 per ton kilometer for operation on the secondary roads under current conditions. The costs for a representative average ACLU haul would probably be somewhat lower, considering that at least a small part of each trip is on primary roads.

A similar analysis was carried out for the period during and after the major repatriation of refugees. in this case, it is assumed that truckers will have access to all of the roads, so that the worst of the roads which must be used now could be avoided, and that road conditions will be moderately improved. Separate estimates were made for primary and secondary roads under these conditions. The results, shown in Tables 7A and 7B, indicate costs of about US$ 380 per 1,000 vehicle kilometers on primary roads and US$ 591 on secondary roads. Still assuming empty return hauls and average loads of 7 and 5 tons respectively, this results in costs of Rs 2.18 per ton kilometer on primary roads and Rs 4.73 on secondary.

7.3 Current Tariffs

Estimates of current tariffs from a number of sources were reviewed, as shown in the working paper in Appendix I, Table A 1-2. There was a wide range in the estimates, probably reflecting different road and security conditions, supply and demand situations, and various degrees of inaccuracy in the estimates. However, the simple average of the estimates is Rs 6.56 per ton kilometer, reasonably close to the Rs 6.1 derived from the vehicle operating cost model. This would indicate that, under current conditions, ACLU should charge in the range of Rs 6 per ton kilometer; either more or less on the different routes depending on the specific road conditions, mix of primary and secondary roads, etc., if it is to have an influence on the tariffs charged by private operators. In the future, as the situation tends more toward the "normal", the tariffs would have to be reduced accordingly. This would almost certainly lead to a need to subsidize the service by charging tariffs below the ACLU costs, as it is unlikely that ACLU, with its unique format and presumably relatively high overhead costs, could compete with the low-overhead private operators on most types of hauls.

TABLE 6 VEHICLE OPERATING COSTS - CURRENT

DATA

Surface type	Flag:1-Paved 0-Unpaved	0
Average roughness	m/km IRI	15.00
Average positive gradient	%	5.00
Average negative gradient	%	5.00
Proportion of uphill travel	%	20.00
Average horizontal curvature	Deg/km	200.00
Average superelevation	Fraction	0.03
Altitude of terrain	m	2000.00
Effective number of lanes	Flag:1-One 0-More than 1	1
Vehicle class: medium truck		
Tare weight	kg	5400.00
Load carried	kg	5000.00
Maximum used driving power	Metric HP	100.00
Maximum used braking power	Metric HP	250.00
Surface type-specific desired speed	km/hour	50.00
Aerodynamic drag coefficient	Dimensionless	0.85
Projected frontal area	m2	5.20
Calibrated engine speed	RPM	1800.00
Energy-efficiency factor	Dimensionless	1.00
Fuel adjustment factor	Dimensionless	1.15
Number of tires per vehicle	#	6.00
Wearable volume of rubber per tire	dm 3	7.60
Retreading cost per new tire cost	Fraction	0.15
Maximum number of recaps	Dimensionless	2.39
Const. term of tire consumption model	dm 3/m	0.16
Tire wear coefficient	10E-3 dm 3/1-m	12.78
Average annual utilization	km	40000.00
Average annual utilization	Hours	1200.00
Hourly utilization ration	Fraction	0.50
Average service life of vehicle	Years	3.00
Use constant service life?	Flag: 1 yes 0-No	1
Average life kilometrage of vehicle	km	120000.0
Number of passenger per vehicle	#	0.00
New vehicle price	$	33000.00
Fuel cost	$/Liter	0.19
Lubricants cost	$/Liter	1.0
New Tire cost	$/Tire	150.00
Crew time cost	$/Hour	3.00
Passenger delay cost	$/Hour	0.00
Maintenance labor cost	$/Hour	1.50
Cargo delay cost	$/Hour	0.00
Annual interest rate	%	10.00

TABLE 6 VEHICLE OPERATING COSTS - CURRENT

ROAD CHARACTERISTICS AND VEHICLE TYPE:

Surface type			Unpa
Average roughness	m/km IRI		15.00
Average positive gradient	%		5.00
Average negative gradient	%		5.00
Proportion of uphill travel	%		20.00
Average horizontal curvature	Deg/km		200.00
Average superelevation	Fraction		0.03
Altitude of terrain	m		2000.00
Effective number of lanes			one
Vehicle class: Medium truck			
PHYSICAL QUANTITIES PER 1000 VEHICLE-KM			
Fuel consumption	Liters		250.23
Lubricants consumption	Liters		5.33
Tire wear	# of equivalent new tires		0.33
Crew time	Hours		34.85
Passenger time	Hours		0.00
Cargo holding	Hours		34.85
Maintenance labor	Hours		16.59
Maintenance parts	% of new vehicle price		0.57
Depreciation	% of new vehicle price		0.90
Interest	% of new vehicle price		0.14
VEHICLE SPEED	km/hour		28.69
VEHICLE OPERATING COSTS PER 1000 VEHI-KM			
Fuel	$	47.50	6.2%
Lubricants	$	5.33	0.7%
Tires	$	48.89	6.4%
Crew time	$	104.56	13.7%
Passenger time	$	0	0.0%
Cargo holding	$	0	0.0%
Maintenance labor	$	24.89	3.3%
Maintenance parts	$	188.76	24.8%
Depreciation	$	297.25	39.0%
Interest	$	44.59	5.9%
TOTAL	$	761.82	100.0

TABLE 7A - VEHICLE OPERATING COSTS FOR PRIMARY ROADS

Surface type	Flag: 1-Paved 0-Unpaved	1
Average roughness	m/km IRI	8.00
Average positive gradient	%	3.00
Average negative gradient	%	3.00
Proportion of uphill travel	%	10.00
Average horizontal curvature	Deg/km	100.00
Average superelevation	Fraction	0.00
Altitude of terrain	m	1200.00
Effective number of lanes	Flag:1-One 0-More than 1	0
Vehicle class: medium truck		
Tare weight	kg	5400.00
Load carried	kg	7000.00
Maximum used driving power	Metric HP	100.00
Maximum used braking power	Metric HP	250.00
Surface type-specific desired speed	km/hour	80.00
Aerodynamic drag coefficient	Dimensionless	0.85
Projected frontal area	m2	5.20
Calibrated engine speed	RPM	1800.00
Energy-efficiency factor	Dimensionless	1.00
Fuel adjustment factor	Dimensionless	1.15
Number of tires per vehicle	#	6.00
Wearable volume of rubber per tire	dm 3	7.60
Retreading cost per new tire cost	Fraction	0.15
Maximum number of recaps	Dimensionless	2.39
Const. term of tire consumption model	dm 3/m	0.16
Tire wear coefficient	10E-3 dm 3/1-m	12.78
Average annual utilization	km	60000.00
Average annual utilization	Hours	1500.00
Hourly utilization ration	Fraction	0.70
Average service life of vehicle	Years	5.00
Use constant service life?	1-Yes 0-No	1
Average life kilometrage of vehicle	km	300000.0
Number of passenger per vehicle	#	0.00
New vehicle price	$	33000.00
Fuel cost	$/Liter	0.19
Lubricants cost	$/Liter	1.00
New Tire cost	$/Tire	150.00
Crew time cost	$/Hour	3.00
Passenger delay cost	$/Hour	0.00
Maintenance labor cost	$/Hour	1.50
Cargo delay cost	$/Hour	0.00
Annual interest rate	%	10.00

TABLE 7A - VEHICLE OPERATING COSTS FOR PRIMARY ROADS

ROAD CHARACTERISTICS AND VEHICLE TYPE:

Surface type			Paved
Average roughness	m/km IRI		8.00
Average positive gradient	%		3.00
Average negative gradient	%		3.00
Proportion of uphill travel	%		10.00
Average horizontal curvature	Deg/km		100.00
Average superelevation	Fraction		0.00
Altitude of terrain	m		1200.00
Effective number of lanes			More than
Vehicle class: Medium truck			
PHYSICAL QUANTITIES PER 1000 VEHICLE-	KM		
Fuel consumption	Liters		129.26
Lubricants consumption	Liters		4.28
Tire wear	# of equivalent new tires		0.14
Crew time	Hours		18.00
Passenger time	Hours		0.00
Cargo holding	Hours		18.00
Maintenance labor	Hours		14.41
Maintenance parts	% of new vehicle price		0.44
Depreciation	% of new vehicle price		0.27
Interest	% of new vehicle price		0.07
VEHICLE SPEED	km/hour		55.56
VEHICLE OPERATING COSTS PER 1000 VEHI	- KM		
Fuel	$	24.56	6.5%
Lubricants	$	4.28	1.1%
Tires	$	21.60	5.7%
Crew time	$	54.00	14.2%
Passenger time	$	0.00	0.0%
Cargo holding	$	0.00	0.0%
Maintenance labor	$	21.62	5.7%
Maintenance parts	$	143.90	37.8%
Depreciation	$	88.44	23.2%
Interest	$	22.11	5.8%
TOTAL	$	380.50	100.0%

TABLE 7B - VEHICLE OPERATING COSTS FOR SECONDARY ROADS

Surface type	Flag:1-Paved 0-Unpaved	0
Average roughness	m/km IRI	12.00
Average positive gradient	%	4.00
Average negative gradient	%	4.00
Proportion of uphill travel	%	15.00
Average horizontal curvature	Deg/km	150.00
Average superelevation	Fraction	0.0
Altitude of terrain	m	2000.00
Effective number of lanes	Flag:1-One 0-More than 1	1
Vehicle class: medium truck		
Tare weight	kg	5400.00
Load carried	kg	5000.00
Maximum used driving power	Metric HP	100.00
Maximum used braking power	Metric HP	250.00
Surface type-specific desired speed	km/hour	60.00
Aerodynamic drag coefficient	Dimensionless	0.85
Projected frontal area	m2	5.20
Calibrated engine speed	RPM	1800.00
Energy-efficiency factor	Dimensionless	1.00
Fuel adjustment factor	Dimensionless	1.15
Number of tires per vehicle	#	6.00
Wearable volume of rubber per tire	dm 3	7.60
Retreading cost per new tire cost	Fraction	0.15
Maximum number of recaps	Dimensionless	2.39
Const. term of tire consumption model	dm 3/m	0.16
Tire wear coefficient	10E-3 dm 3/1-m	12.78
Average annual utilization	km	50000.00
Average annual utilization	Hours	1200.00
Hourly utilization ration	Fraction	0.60
Average service life of vehicle	Years	4.00
Use constant service life?	1-Yes 0-No	1
Average life kilometrage of vehicle	km	200000.0
Number of passenger per vehicle	#	0.00
New vehicle price	$	33000.00
Fuel cost	$/Liter	0.19
Lubricants cost	$/Liter	1.0
New Tire cost	$/Tire	150.00
Crew time cost	$/Hour	3.00
Passenger delay cost	$/Hour	0.00
Maintenance labor cost	$/Hour	1.50
Cargo delay cost	$/Hour	0.00
Annual interest rate	%	10.00

TABLE 7B - VEHICLE OPERATING COSTS FOR SECONDARY ROADS

ROAD CHARACTERISTICS AND VEHICLE TYPE:

Surface type		Unpaved
Average roughness	m/km IRI	12.00
Average positive gradient	%	4.00
Average negative gradient	%	4.00
Proportion of uphill travel	%	15.00
Average horizontal curvature	Deg/km	150.00
Average superelevation	Fraction	0.00
Altitude of terrain	m	2000.00
Effective number of lanes		One
Vehicle class: Medium truck		
PHYSICAL QUANTITIES PER 1000 VEHICLE- KM		
Fuel consumption	Liters	192.49
Lubricants consumption	Liters	4.88
Tire wear	# of equivalent new tires	0.21
Crew time	Hours	29.02
Passenger time	Hours	0.00
Cargo holding	Hours	29.02
Maintenance labor	Hours	16.35
Maintenance parts	% of new vehicle price	0.56
Depreciation	% of new vehicle price	0.56
Interest	% of new vehicle price	0.11
VEHICLE SPEED	km/hour	34.46

VEHICLE OPERATING COSTS PER 1000 VEHI - KM			
Fuel	$	36.57	6.2%
Lubricants	$	4.88	0.8%
Tires	$	31.72	5.4%
Crew time	$	87.07	14.7%
Passenger time	$	0.00	0.0%
Cargo holding	$	0.00	0.0%
Maintenance labor	$	24.52	4.1%
Maintenance parts	$	183.43	31.0%
Depreciation	$	185.72	31.4%
Interest	$	37.14	6.3%
TOTAL	$	591.05	100.0%

7.4 Conclusion

It should be recognized that, regardless of the tariff charged by ACLU, the operation is unlikely to have a significant impact on general tariff levels because the second condition would not be met. As indicated in the previous section of this report, ACLU now accounts for less than half of one percent of the total estimated trucking capacity. It is highly unlikely that this would have any significant impact, and in fact may be viewed as little more than a minor nuisance factor by the private truckers (who may nevertheless find it politic to complain of the "unfair competition").

VIII. THE QUETTA OPERATION

Section 6 of this volume indicated that there could be a significant advantage in using Quetta as an originating point for cargo destined for some locations in Afghanistan. The development of approximate vehicle operating cost estimates permits a rough calculation of the possible savings in transport costs. Table 8 shows the total estimated vehicle operating costs under two conditions: one with Peshawar as the only point of origin, and the other using Quetta in those cases where the distances to the destinations are shorter. The calculations were made using the vehicle operating costs estimated in Section 7.2 for the period during and after the major repatriation: Rs 2.18 per ton kilometer on primary roads and Rs 4.73 on secondary roads.

The results show a total annual cost of Rs 2,761.7 million when Peshawar is the sole origin and Rs 2,046.1 million when Quetta is added; a saving of Rs 715.6 million (approximately US$ 35 million) or about 26 percent of the total vehicle operating cost. This applies to the total cargo movement. The saving to ACLU would depend on the volume carried by ACLU and the extent to which the shipments were directed to those destinations best reached via Quetta. If ACLU were to carry volumes roughly in proportion to their estimated share of the total fleet (about half of one percent), and with a proportional share of the destination provinces, the cost would be about 0.5 percent of the costs shown in Table 8. Thus, with Peshawar as the only origin, the cost would be about Rs 13.8 million. With the added use of Quetta, the cost would be Rs 10.2 million; a saving of Rs 3.6 million per year. There would also be an additional saving because of the shorter distance and lower transport cost between Karachi and Quetta.

IX. BENEFITS OF ROAD IMPROVEMENTS

The analysis carried out to this point has been under the assumption that, while access to the roads would be improved and that the worst of the roads now used could be avoided during and after the period of major repatriation, there would be no major expenditures for road rehabilitation and subsequent maintenance. However, the relatively low vehicle productivity and high vehicle operating costs suggest that there could be significant benefits from such expenditures.

TABLE 8: VEHICLE OPERATING COSTS WITHOUT AND WITH QUETTA AS A POINT OF ORIGIN

		Peshawar Only				Peshawar and Quetta									
						Peshawar				Quetta					
	DESTINATIONS	Tons (000)	Distance Prim.	Distance Secon.	VOC (Rs m.)	Tons (000)	Distance Prim.	Distance Secon.	VOC (Rs m.)	Tons (000)	Distance Prim.	Distance Secon.	VOC (Rs m.)	TOTAL (Rs m.)	SAVING (Rs m.)
N	1 Balkh	7.7	702		11.7	7.7	702		11.7		1137		0.0	11.7	0.0
	2 Fariab	0.0	850	205	0.0	0.0	850	205	0.0		792	455	0.0	0.0	0.0
	3 Jawzjan	4.1	850		7.7	4.1	850		7.7		1285		0.0	7.7	0.0
	4 Samangan	8.8	583		11.2	8.8	583		11.2		1332		0.0	11.2	0.0
NE	5 Badakhshan	14.1	585	230	33.2	14.1	585	230	33.2		1020	230	0.0	33.2	0.0
	6 Baghlan	52.2	535		60.9	52.2	535		60.9		970		0.0	60.9	0.0
	7 Kunduz	38.2	615		51.2	38.2	615		51.2		1050		0.0	51.2	0.0
	8 Takhar	2.5	585	72	4.1	2.5	585	72	4.1		1020	72	0.0	4.1	0.0
E	9 Kunar	117.3	131	92	84.5	117.3	131	92	84.5		858	92	0.0	84.5	0.0
	10 Laghman	117.3	155	22	51.8	117.3	155	22	51.8		830	22	0.0	51.8	0.0
	11 Nangrahar	209.8	131		59.9	209.8	131		59.9		858		0.0	59.9	0.0
	12 Paktia	183.5	347	81	209.1	183.5	347	81	209.1		648	81	0.0	209.1	0.0
EC	13 Bamyan	0.0	351	160	0.0	0.0	351	160	0.0		778	160	0.0	0.0	0.0
	14 Ghazni	251.7	411		225.5	251.7	411		225.5		578		0.0	225.5	0.0
	15 Kabul	48.2	277		29.1	48.2	277		29.1		712		0.0	29.1	0.0
	16 Kapisa	0.0	207	65	0.0	0.0	207	65	0.0		766	35	0.0	0.0	0.0
	17 Logar	197.9	277	65	180.3	197.9	277	65	180.3		648	30	0.0	180.3	0.0
	18 Parwan	37.1	341		27.5	37.1	341		27.5		778		0.0	27.5	0.0
	19 Wardak	6.3	307	10	4.5	6.3	307	10	4.5		682	10	0.0	4.5	0.0
S	20 Helmand	75.7	879	45	161.2		879	45	0.0	75.7	350	45	73.9	73.9	87.3
	21 Kandahar	227.7	759		376.7		759		0.0	227.7	230		114.1	114.1	262.5
	22 Nimroz	57.2	879	342	202.0		879	342	0.0	57.2	350	342	136.1	136.1	65.9
	23 Paktika	130.9	411	65	157.6	130.9	411	65	157.6		578	65	0.0	157.6	0.0
	24 Uruzgan	24.9	411	340	62.4		411	340	0.0	24.9	230	145	29.6	29.6	32.8
	25 Zabul	23.9	629		32.8		629		0.0	23.9	360		18.8	18.8	14.0
NW	26 Badghis	21.6	1321	138	76.3		1321	138	0.0	21.6	792	138	51.4	51.4	24.9
	27 Farah	100.4	1147	75	286.7		1147	75	0.0	100.4	613	75	169.8	169.8	116.9
	28 Ghor	21.6		744	76.0	21.6		744	76.0		792	361	0.0	76.0	0.0
	29 Herat	96.4	1321		277.6		1321		0.0	96.4	792		166.4	166.4	111.2
	TOTALS	2077.0			2761.7	1449.2			1286.0	627.8			760.1	2046.1	715.6

VOC per Ton Km., Primary: 2.18
VOC per Ton Km., Secondary: 4.73

A test run of the vehicle operating cost (VOC) model was carried out using the same input data as shown in Table 7A (a 10-ton truck on existing primary roads), but assuming modest improvement in the paved roads. The main changes are in the road roughness, the load carried, speed, vehicle utilization and vehicle lifetime. The input assumptions and results are shown in the two pages of Table 9. The resulting operating cost is US$ 265 per 1,000 kilometers, a reduction of 30 percent of the previous cost per vehicle kilometer shown in Table 7A. With the increase in load carried from 7 to 9 tons, the cost saving per ton kilometer is over 45 percent. It is probable that a similar percentage cost saving could be realized on the secondary roads.

The rehabilitation of the roads would also permit the more effective use of larger trucks. A further test run was carried out using the same inputs as in Table 9, but substituting a 20-ton truck carrying 18 tons for the 10-ton truck carrying 9 tons. The results, shown in Table 10, indicate a reduction of 28 percent in the cost per ton kilometer when compared with the results of Table 9. The combination of improved roads and larger vehicles results in a total reduction of about 61 percent in the cost per ton kilometer. It is clear that this possibility should be investigated further, to the level of at least a pre-feasibility study of possible road improvements.

Even if considerable road rehabilitation is carried out during the period in question, it is clear that there will still be a need for transportation services over very low-standard roads between the distribution centers in each province and the ultimate destinations of the commodities. In many cases these roads will continue to be negotiable only with four-wheel-drive vehicles. Considering that the private sector fleet includes few if any such vehicles, ACLU could consider adopting this more specialized role, for which its fleet is uniquely suited.

X. RECURRENT COSTS

It is difficult to estimate the probable future recurrent costs of ACLU without a historical record of the costs of the organization. Again, a very rough approximation can be made on the basis of the costs developed in the vehicle operating cost model. As shown in Section 7.2, the average production per vehicle has been about 80,000 ton kilometers per year, and the vehicle operating cost was estimated at Rs 6.1 per ton kilometer. With a fleet of 80 vehicles, this would result in a total cost of about Rs 39 million per year, with the cost elements as listed on the second page of Table 6. These costs do not include the (probably) relatively high overhead costs of ACLU, and may be understated in this respect. However, they do include the fully allocated costs of vehicle maintenance, whereas ACLU already has a maintenance facility in place, and part of the maintenance cost could therefore be considered a sunk cost. In addition, the interest costs included in the estimate could reasonably be excluded from the recurrent costs in this case. Assuming these factors balance out, the cost would remain in the area of (say) Rs 40 million per year. If the nature of the operation were to remain the same, increases in the size of the fleet would result in a somewhat less than proportional increase in costs, assuming that some of the

TABLE 9 VEHICLE OPERATING COSTS FOR IMPROVED ROADS

Surface type	Flag: 1-Paved 0-Unpaved	1
Average roughness	m/km IRI	4.00
Average positive gradient	%	3.00
Average negative gradient	%	3.00
Proportion of uphill travel	%	10.00
Average horizontal curvature	Deg/km	100.00
Average superelevation	Fraction	0.00
Altitude of terrain	m	1200.00
Effective number of lanes	Flag:1-One 0-More than 1	0
Vehicle class: medium truck		
Tare weight	kg	5400.00
Load carried	kg	9000.00
Maximum used driving power	Metric HP	100.00
Maximum used braking power	Metric HP	250.00
Surface type-specific desired speed	km/hour	85.00
Aerodynamic drag coefficient	Dimensionless	0.85
Projected frontal area	m2	5.20
Calibrated engine speed	RPM	1800.00
Energy-efficiency factor	Dimensionless	1.00
Fuel adjustment factor	Dimensionless	1.15
Number of tires per vehicle	#	6.00
Wearable volume of rubber per tire	dm 3	7.60
Retreading cost per new tire cost	Fraction	0.15
Maximum number of recaps	Dimensionless	2.39
Const. term of tire consumption model	dm 3/m	0.16
Tire wear coefficient	10E-3 dm 3/1-m	12.78
Average annual utilization	km	70000.00
Average annual utilization	Hours	1600.00
Hourly utilization ration	Fraction	0.75
Average service life of vehicle	Years	7.00
Use constant service life?	Flag: 1-Yes 0-No	1
Average life kilometrage of vehicle	km	490000.0
Number of passenger per vehicle	#	0.00
New vehicle price	$	33000.00
Fuel cost	$/Liter	0.19
Lubricants cost	$/Liter	1.00
New Tire cost	$/Tire	150.00
Crew time cost	$/Hour	3.00
Passenger delay cost	$/Hour	0.00
Maintenance labor cost	$/Hour	1.50
Cargo delay cost	$/Hour	0.00
Annual interest rate	%	10.00

TABLE 9 VEHICLE OPERATING COSTS FOR IMPROVED ROADS

ROAD CHARACTERISTICS AND VEHICLE TYPE:

Surface type			Paved
Average roughness	m/km IRI		4.00
Average positive gradient	%		3.00
Average negative gradient	%		3.00
Proportion of uphill travel	%		10.00
Average horizontal curvature	Deg/km		100.00
Average superelevation	Fraction		0.00
Altitude of terrain	m		1200.00
Effective number of lanes			More Than
Vehicle class: Medium truck			
PHYSICAL QUANTITIES PER 1000 VEHICLE-	KM		
Fuel consumption	Liters		118.06
Lubricants consumption	Liters		3.67
Tire wear	# of equivalent new tires		0.14
Crew time	Hours		14.89
Passenger time	Hours		0.00
Cargo holding	Hours		14.89
Maintenance labor	Hours		11.26
Maintenance parts	% of new vehicle price		0.27
Depreciation	% of new vehicle price		0.15
Interest	% of new vehicle price		0.05
VEHICLE SPEED	km/hour		67.18
VEHICLE OPERATING COSTS PER 1000 VEHI-	KM		
Fuel	$	22.43	8.5%
Lubricants	$	3.67	1.4%
Tires	$	20.57	7.8%
Crew time	$	44.66	16.9%
Passenger time	$	0.00	0.0%
Cargo holding	$	0.00	0.0%
Maintenance labor	$	16.90	6.4%
Maintenance parts	$	89.49	33.8%
Depreciation	$	49.73	18.8%
Interest	$	17.41	6.6%
TOTAL	$	264.86	100.0%

TABLE 10 VEHICLE OPERATING COSTS FOR 20-TON TRUCKS

Surface type	Flag: 1-Paved 0-Unpaved	1
Average roughness	m/km IRI	4.00
Average positive gradient	%	3.00
Average negative gradient	%	3.00
Proportion of uphill travel	%	10.00
Average horizontal curvature	Deg/km	100.00
Average superelevation	Fraction	0.00
Altitude of terrain	m	1200.00
Effective number of lanes	Flag:1-One 0-More than	0
Vehicle class: medium truck		
Tare weight	kg	7200.00
Load carried	kg	18000.00
Maximum used driving power	Metric HP	100.00
Maximum used braking power	Metric HP	250.00
Surface type-specific desired speed	km/hour	85.00
Aerodynamic drag coefficient	Dimensionless	0.85
Projected frontal area	m2	5.20
Calibrated engine speed	RPM	1800.00
Energy-efficiency factor	Dimensionless	1.00
Fuel adjustment factor	Dimensionless	1.15
Number of tires per vehicle	#	10.00
Wearable volume of rubber per tire	dm 3	7.60
Retreading cost per new tire cost	Fraction	0.15
Maximum number of recaps	Dimensionless	2.39
Const. term of tire consumption model	dm 3/m	0.16
Tire wear coefficient	10E-3 dm 3/1-m	12.78
Average annual utilization	km	70000.00
Average annual utilization	Hours	1600.00
Hourly utilization ration	Fraction	0.75
Average service life of vehicle	Years	7.00
Use constant service life?	1-Yes 0-No	1
Average life kilometrage of vehicle	km	490000.00
Number of passenger per vehicle	#	0.00
New vehicle price	$	42000.00
Fuel cost	$/Liter	0.19
Lubricants cost	$/Liter	1.00
New Tire cost	$/Tire	200.00
Crew time cost	$/Hour	3.00
Passenger delay cost	$/Hour	0.00
Maintenance labor cost	$/Hour	1.50
Cargo delay cost	$/Hour	0.00
Annual interest rate	%	10.00

TABLE 10 VEHICLE OPERATING COSTS FOR 20-TON TRUCKS

ROAD CHARACTERISTICS AND VEHICLE TYPE:			
Surface type			Paved
Average roughness	m/km IRI		4.00
Average positive gradient	%		3.00
Average negative gradient	%		3.00
Proportion of uphill travel	%		10.00
Average horizontal curvature	Deg/km		100.00
Average superelevation	Fraction		0.00
Altitude of terrain	m		1200.00
Effective number of lanes			More than1
Vehicle class: Medium truck			
PHYSICAL QUANTITIES PER 1000 VEHICLE-KM			
Fuel consumption	Liters		150.58
Lubricants consumption	Liters		3.67
Tire wear	# of equivalent new tire		0.24
Crew time	Hours		17.40
Passenger time	Hours		0.00
Cargo holding	Hours		17.40
Maintenance labor	Hours		15.17
Maintenance parts	% of new vehicle price		0.32
Depreciation	% of new vehicle price		0.17
Interest	% of new vehicle price		0.06
VEHICLE SPEED	km/hour		57.49
VEHICLE OPERATING COSTS PER 1000 VEHICLE-KM			
Fuel	$	28.61	7.5%
Lubricants	$	3.67	1.0%
Tires	$	48.09	12.6%
Crew time	$	52.19	13.6%
Passenger time	$	0.00	0.0%
Cargo holding	$	0.00	0.0%
Maintenance labor	$	22.76	5.9%
Maintenance parts	$	132.45	34.6%
Depreciation	$	70.35	18.4%
Interest	$	24.62	6.4%
TOTAL	$	382.75	100.0%

costs, such as administrative costs, would remain relatively constant over a reasonable range of fleet sizes.

It is again emphasized that the estimates made in this study, and especially the cost estimates, are based on very little empirical data, and should be considered as only roughly indicative at best. However, they provide a starting point and suggest the areas which should receive further attention and more detailed study in considering the future role of ACLU. In addition, the analysis system used here can be refined and reapplied as more data become available, and can be used by others in the interim to test the effects of alternative assumptions.

XI. DIVESTITURE

There are a number of factors to be considered in evaluating the possibility of divesting ACLU of its transport operations and transferring the vehicle fleet and/or vehicle maintenance facilities to private enterprize. Some preliminary thoughts on advantages and disadvantages are listed below.

-Privatization creates an opportunity for small-scale entrepreneurs, and there is some advantage in having a large number of individuals each with a small stake in the economy.

-There are generally no significant economies of scale in trucking operations, other than in the provision of maintenance facilities and parts supplies. These can be provided independently of the trucking operations themselves, so the dispersal of ownership incurs little if any loss in this respect.

-Experience indicates that competition among a number of operators generally tends to result in tariffs that reflect the costs of operation; in relatively efficient operation when compared to that of a large bureaucracy, and in more appropriate fleet sizes, although some degree of government regulation may be considered necessary to prevent costly overcapacity in some cases.

-A number of smaller operators would probably be more responsive to the needs of the areas they serve, and possibly more compatible with the tribal nature of the society.

-Over time, the mobilization of private capital would reduce the funding required from government and/or aid organizations.

-With a number of private operators, the system could be less susceptible to strikes and other interruptions to service (although this is not necessarily the case).

-The system would be less subject to government control and possibly less responsive in furthering social objectives.

-The possibility of developing reliable statistics would be reduced under dispersed ownership.

-There would be less standardization in the fleet and a requirement for a larger stock of spare parts under dispersed ownership.

In general, if extensive repatriation of refugees is expected over the next few years, it would seem more appropriate to maintain the existing centralized control over this period. Substantial time could be required to identify suitable candidate private-enterprise operators, arrange means of financing their payment for the assets to be transferred, and establish an effective and reliable operation. This could be detrimental to an orderly repatriation operation in the short run. In the longer run, it is probable that private enterprize will be the more appropriate structure for the road transport industry, and the encouragement of a substantial publicly-owned commercial trucking operation is not recommended. For this reason ACLU should not plan on continuing the commercial-type trucking operation beyond the end of the repatriation period.

The vehicle maintenance operation could still be beneficial at that time, but should also be a private enterprise function in the longer run. Routine and to some extent periodic road maintenance are legitimate public functions, although in some cases in other countries they have been turned over to private contractors. This is not recommended in this case, and plans should be made to merge the road maintenance capability of ACLU with the government facilities when the political situation has been resolved.

APPENDIX I

WORKING PAPERS FOR SHIPMENT VOLUMES

AND

TARIFF ESTIMATES

TABLE A 1-1: WORKING PAPER - ESTIMATES OF VOLUME OF SHIPMENTS
(Tons, except where specified otherwise)

	Wheat	Rice	Oil	Dried Milk	Pulses	Sugar	Tea	Seed	fertil-izer	Oxen	Tools	Tractors	Insect-icide	Tree Seed-lings	Construction Materials and Equipment: Irrig.	Roads	Houses & Bldgs.	School (+ supp.)	Drugs, Medic. & Hospit.	Fuel	Other
SOURCE 1	540000	865	40000	7250	3000	17400	1700									$15 m.	$16.2 m.	$2 m.	$9.6 m.		
	132000	----------		24000	----------			10300	50000	$0.7 m.	$0.2 m.	$2.5 m.	$0.5 m.								
											"Other 25000 tons"										
	(540000, etc. is forneeds in Afghanistan + refugees in Pak. & Iran for 1989.																				
	132000, etc. is for use in Afghanistan itself.)																				
SOURCE 2	300000																				
	For 6 months, for refugees only (p. 25)				Over a 3-year period ----> (p. 31)			60100		100000 pair	100000 pieces	2000 units		21 million trees							
SOURCE 3	450000 (1)		25800	5500		17200	1290														
	(1) 1988 requirement to feed > 2 mill. refugees in Pakistan.																				
								56000 (Relief & rehab., 1988/89)													
	N & NE regions expected to have surplus wheat prod'n (p.106-9) E will need at least 160000T/yr; EC 210000; S will have grain deficit of 40-50% if all displaced return; NW "significant food deficit if all return." Fertilizer: N needs a small amount; NE accounts for 18% of Afghan consumption; E 13%; EC 27%; S 30%; NW not reported.																				
SOURCE 4	500000 (Per year until rehabilitated)							50000	150000	100000							High-speed diesel (T/yr)			600000	
	130000 (Estimated 1989 requirement)							10000	50000	(3 pair per truck)							Kerosene (T/yr) (estimated total Afgn. needs)			100000	
																	(Re. fuel: is any supplied by USSR or Iran?)				
SELECTED VALUES (All in Tons)	500000	900	40000	7300	3000	17400	1700	60000	150000	330000 (1)	1000	10000 (2)	100	4200 (3)			200000 (4)		1000	700000	50400
								(1) "Equivalent tons" for truck capacity, based on 3 pair of oxen per 10-ton truck.				(2) Based on 2000 tractors at an average of 5 tons per tractor.		(3) Based on 21 million seedlings at 5 seedlings per kilogram.		(4) Arbitrary estimate.				

Sources:

1. Operation Salam, the United Nations Plan of Action, 1989
2. Project Market Place. Undated, but apparently written in 1989.
3. UN Coordinator - First Consolidated Report, Sept. 1988.
4. UNILOG: Interview, Mr. De Silva, 26 June 1989.

OTHER: Provisional estimates of rural infrastructure damage (Source 3)

Schools damaged	2000
Health centers damaged	130
Bridges destroyed	350
Paved roads damaged (km.)	2000 (70% of total)
Secondary roads damaged (km.)	3000 (25% of total)
Trucks destroyed	5000 (20% of total)

Changes in agriculture, 1978/79 to 1986/87 (Source 3)

Reduction in wheat yield (%)	54
Reduction in wheat area (%)	30
Livestock lost	5000000 (20% of total)
Livestock left country	1350000
Pairs of oxen left country	150000 (50% of total)

TABLE A 1-2: WORKING PAPER - ESTIMATED TARIFFS

SOURCE				Rs Per Ton Km.	COMMENTS
ACLU/AID estimate				5.78	Includes empty return haul.
A. Kemal, LBI, Islamabad				0.40	Line haul, Karachi-Peshawar. Rs 700/T, 1736 Km.
				0.49	Line haul, Karachi-Quetta. Rs 350/T, 715 Km.
Mir Mhd. Seddiq				18.18	Pesh. - Wardak/Logar, 10-T truck carrying 5 T, Rs 30000
				12.12	Pesh. - Wardak/Logar, 20-T truck carrying 10 T, Rs 40000
					317 & 342 km.; avg. 330.
Ibrahim Rashid	Within Pak. on good roads.			0.57	Rs 240/T for 420 Km., incl. empty return haul; 14-15 hours.
				2.85	On bad roads, charge can be at least 5 times as much.
Cross-Border Trade Draft Report, p. 16				12.89	250 Afghanis/seer (7 kg.), Pesh. to near Kabul (p. 16).
					Af. 200 = US$ 1. Distance about 277 km.
	Rs/ T	Km.	Tons		(Rs 3570/T; 12.89 Tkm.)
P. 23	3000	411	5	7.30	(current)
	1000	223	5	4.48	(current)
	2800	277	5	10.11	(current)
	3200	207	5	15.46	(current)
	3400	307	5	11.07	(current)
	2600	635	5	4.09	(current)
	3200	277	5	11.55	(current)
	1000	277	5	3.61	(current)
	300	277	20	1.08	(normal)
	1500	277	10	5.42	(current)
	500	277	10	1.81	(normal)
	100	53	10	1.89	(current)
Average, all sources				6.56	
This study, Vehicle Operating Cost Model				6.10	$762/1000km., 5 T. Current VOC, Secondary & Tertiary Roads, conflict conditions
				2.18	$381/1000km., 7 T. Future, Primary Roads
				4.73	$591/1000km., 5 T. Future, Secondary Roads

APPENDIX II

ANALYSIS SYSTEM RUNS

RUN 1.

-FULL ACCESS TO EXISTING ROAD SYSTEM
-ALL CARGO ORIGINATING IN PESHAWAR.
-CARGO DISTRIBUTED ACCORDING TO NUMBER OF EXTERNALLY-
LOCATED REFUGEES ORIGINATING IN EACH PROVINCE.

RUN PARAMETERS: RUN NUMBER 1

1. Total Commodity Volumes (000 tons per year):

Wheat	500
Fertilizer	150
Other Dry Cargo	727
Fuel	700
Total	2077

2. Commodity Distribution by province:
in proportion to the number of external refugees originating in each province.

3. Origins of Commodities: all from Peshawar.

4. Vehicle Data:

	Average Capacity (tons per truck)	Average Km./day per Truck	Average Vehicle Avail-ability
On Primary Roads:	10	400	60%
On Secondary Roads:	5	200	40%

Any of the numerical parameters in this box can be changed, and the new results will show immediately on recalculation (Key F9).

TABLE 1-1: REFUGEES BY PROVINCE

	PROVINCE	Est. Pop'n, 1979 (000)	Refugees by Province of Origin, 1987/88 NWFP	Bal'n	Punjab	Iran	Total Refugees (000)	Total as % of Prov. Pop'n.	Total as % of Refugee Pop'n.
		(1)	(2)	(3)	(4)	(4)	(5)	(6)	(7)
N	1 Balkh	569	2	5	6		13	2.3	0.3
	2 Fariab	588					NA		
	3 Jawzjan	589			7		7	1.2	0.2
	4 Samangan	273	4	5	6		15	5.5	0.4
NE	5 Badakhshan	498	28				28	5.6	0.7
	6 Baghlan	494	52	5	47		104	21.1	2.7
	7 Kunduz	555	30	5	41		76	13.7	2.0
	8 Takhar	520		5			5	1.0	0.1
E	9 Kunar	250	223				223	89.2	5.9
	10 Laghman	811	223				223	27.5	5.9
	11 Nangrahar	746	389		10		399	53.5	10.5
	12 Paktia	498	314	16	19		349	70.1	9.2
EC	13 Bamyan	269					NA		
	14 Ghazni	647	264	96			360	55.6	9.5
	15 Kabul	1319	56		13		69	5.2	1.8
	16 Kapisa	346					NA		
	17 Logar	258	262	21			283	109.7	7.4
	18 Parwan	410	48		5		53	12.9	1.4
	19 Wardak	288		9			9	3.1	0.2
S	20 Helmand	518		135		20	155	29.9	4.1
	21 Kandahar	567	1	463	2		466	82.2	12.3
	22 Nimroz	104		17		100	117	112.5	3.1
	23 Paktika	245	266		2		268	109.4	7.1
	24 Uruzgan	444		11		40	51	11.5	1.3
	25 Zabul	179	1	48			49	27.4	1.3
NW	26 Badghis	234		3		40	43	18.4	1.1
	27 Farah	225				200	200	88.9	5.3
	28 Ghor	388		3		40	43	11.1	1.1
	29 Herat	769				192	192	25.0	5.1
	TOTALS	13601	2163	847	158	632	3800	27.9	100.0

Sources:

Columns 1 to 7: derived from English, Richard,"Preliminary Report on Conditions Affecting the Repatriation of Afghan Refugees", prepared for the United Nations High Commissioner for Refugees, 20 June 1988. Number of refugees does not include an estimated 300,000 unregistered refugees. Population estimate does not include approximately 300,000 nomads.

TABLE 1-2: DISTRIBUTION OF COMMODITIES BY PROVINCE

	DESTINATIONS	COMMODITIES: TONS (000) Wheat	Fert-ilizer	Other Dry	Fuel	TOTALS
N	1 Balkh	1.7	0.5	2.5	2.4	7.1
	2 Fariab	0.0	0.0	0.0	0.0	0.0
	3 Jawzjan	0.9	0.3	1.3	1.3	3.8
	4 Samangan	2.0	0.6	2.9	2.8	8.2
NE	5 Badakhshan	3.7	1.1	5.4	5.2	15.3
	6 Baghlan	13.7	4.1	19.9	19.2	56.8
	7 Kunduz	10.0	3.0	14.5	14.0	41.5
	8 Takhar	0.7	0.2	1.0	0.9	2.7
E	9 Kunar	29.3	8.8	42.7	41.1	121.9
	10 Laghman	29.3	8.8	42.7	41.1	121.9
	11 Nangrahar	52.5	15.8	76.3	73.5	218.1
	12 Paktia	45.9	13.8	66.8	64.3	190.8
EC	13 Bamyan	0.0	0.0	0.0	0.0	0.0
	14 Ghazni	47.4	14.2	68.9	66.3	196.8
	15 Kabul	9.1	2.7	13.2	12.7	37.7
	16 Kapisa	0.0	0.0	0.0	0.0	0.0
	17 Logar	37.2	11.2	54.1	52.1	154.7
	18 Parwan	7.0	2.1	10.1	9.8	29.0
	19 Wardak	1.2	0.4	1.7	1.7	4.9
S	20 Helmand	20.4	6.1	29.7	28.6	84.7
	21 Kandahar	61.3	18.4	89.2	85.8	254.7
	22 Nimroz	15.4	4.6	22.4	21.6	63.9
	23 Paktika	35.3	10.6	51.3	49.4	146.5
	24 Uruzgan	6.7	2.0	9.8	9.4	27.9
	25 Zabul	6.4	1.9	9.4	9.0	26.8
NW	26 Badghis	5.7	1.7	8.2	7.9	23.5
	27 Farah	26.3	7.9	38.3	36.8	109.3
	28 Ghor	5.7	1.7	8.2	7.9	23.5
	29 Herat	25.3	7.6	36.7	35.4	104.9
	TOTALS	500	150	727	700	2077.0

Distribution based on number of external refugees from each province.

TABLE 1-3: CARGO BY ORIGINS AND DESTINATIONS

(000 Tons)

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	7.1				7.1
	2 Fariab	0.0				0.0
	3 Jawzjan	3.8				3.8
	4 Samangan	8.2				8.2
NE	5 Badakhshan	15.3				15.3
	6 Baghlan	56.8				56.8
	7 Kunduz	41.5				41.5
	8 Takhar	2.7				2.7
E	9 Kunar	121.9				121.9
	10 Laghman	121.9				121.9
	11 Nangrahar	218.1				218.1
	12 Paktia	190.8				190.8
EC	13 Bamyan	0.0				0.0
	14 Ghazni	196.8				196.8
	15 Kabul	37.7				37.7
	16 Kapisa	0.0				0.0
	17 Logar	154.7				154.7
	18 Parwan	29.0				29.0
	19 Wardak	4.9				4.9
S	20 Helmand	84.7				84.7
	21 Kandahar	254.7				254.7
	22 Nimroz	63.9				63.9
	23 Paktika	146.5				146.5
	24 Uruzgan	27.9				27.9
	25 Zabul	26.8				26.8
NW	26 Badghis	23.5				23.5
	27 Farah	109.3				109.3
	28 Ghor	23.5				23.5
	29 Herat	104.9				104.9
	TOTALS	2077.0	0.0	0.0	0.0	2077.0

TABLE 1-4: ROAD DISTANCES (KMS.)

		Province	Center	1 Peshawar			2 Quetta			3		
				Primary	Secondary	Total	Primary	Secondary	Total	Primary	Secondary	Total
N	1	Balkh	Mazar-e-Sh.	702		702	1137		1137			
	2	Fariab	Maymana	850	205	1055	792	455	1247			
	3	Jawzjan	Sheberghan	850		850	1285		1285			
	4	Samangan	Samangan	583		583	1332		1332			
NE	5	Badakhshan	Faizabad	585	230	815	1020	230	1250			
	6	Baghlan	Baghlan	535		535	970		970			
	7	Kunduz	Kunduz	615		615	1050		1050			
	8	Takhar	Taloqan	585	72	657	1020	72	1092			
E	9	Kunar	Asadabad	131	92	223	858	92	950			
	10	Laghman	Mehterlam	155	22	177	830	22	852			
	11	Nangrahar	Jalalabad	131		131	858		858			
	12	Paktia	Gardaiz	347	81	428	648	81	729			
EC	13	Bamyan	Bamyan	351	160	511	778	160	938			
	14	Ghazni	Ghazni	411		411	578		578			
	15	Kabul	Kabul	277		277	712		712			
	16	Kapisa	Mahmud Raqi	207	65	272	766	35	801			
	17	Logar	Puli Alam	277	65	342	648	30	678			
	18	Parwan	Charikar	341		341	778		778			
	19	Wardak	Maydan Shar	307	10	317	682	10	692			
S	20	Helmand	Lashkargah	879	45	924	350	45	395			
	21	Kandahar	Kandahar	759		759	230		230			
	22	Nimroz	Zaranj	879	342	1221	350	342	692			
	23	Paktika	Sharan	411	65	476	578	65	643			
	24	Uruzgan	Yarin Kot	411	340	751	230	145	375			
	25	Zabul	Qalat	629		629	360		360			
NW	26	Badghis	Qala Nau	1321	138	1459	792	138	930			
	27	Farah	Farah	1147	75	1222	613	75	688			
	28	Ghor	Chaghcharan		744	744	792	361	1153			
	29	Herat	Herat	1321		1321	792		792			

Notes:

1. Provincial capitals used as provincial centroids.
2. Distances represent shortest route between points with maximum use of primary roads.
3. Distances are approximate.

TABLE 1-5: VEHICLE CAPACITY

(Average tons per truck)

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4
N	1 Balkh	10.0			
	2 Fariab	9.0			
	3 Jawzjan	10.0			
	4 Samangan	10.0			
NE	5 Badakhshan	8.6			
	6 Baghlan	10.0			
	7 Kunduz	10.0			
	8 Takhar	9.5			
E	9 Kunar	7.9			
	10 Laghman	9.4			
	11 Nangrahar	10.0			
	12 Paktia	9.1			
EC	13 Bamyan	8.4			
	14 Ghazni	10.0			
	15 Kabul	10.0			
	16 Kapisa	8.8			
	17 Logar	9.0			
	18 Parwan	10.0			
	19 Wardak	9.8			
S	20 Helmand	9.8			
	21 Kandahar	10.0			
	22 Nimroz	8.6			
	23 Paktika	9.3			
	24 Uruzgan	7.7			
	25 Zabul	10.0			
NW	26 Badghis	9.5			
	27 Farah	9.7			
	28 Ghor	5.0			
	29 Herat	10.0			

Assumes 10 tons per truck on primary roads and 5 tons on secondary roads. Results represent weighted averages by type of road for each origin-destination pair.

Capacity on primary roads (tons/truck): 10
Capacity on secondary roads (tons/truck): 5

TABLE 1-6: VEHICLE TRIPS REQUIRED

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	711				711
	2 Fariab	0				0
	3 Jawzjan	383				383
	4 Samangan	820				820
NE	5 Badakhshan	1782				1782
	6 Baghlan	5684				5684
	7 Kunduz	4154				4154
	8 Takhar	289				289
E	9 Kunar	15356				15356
	10 Laghman	12996				12996
	11 Nangrahar	21809				21809
	12 Paktia	21069				21069
EC	13 Bamyan	0				0
	14 Ghazni	19677				19677
	15 Kabul	3771				3771
	16 Kapisa	0				0
	17 Logar	17092				17092
	18 Parwan	2897				2897
	19 Wardak	500				500
S	20 Helmand	8683				8683
	21 Kandahar	25471				25471
	22 Nimroz	7436				7436
	23 Paktika	15722				15722
	24 Uruzgan	3603				3603
	25 Zabul	2678				2678
NW	26 Badghis	2467				2467
	27 Farah	11278				11278
	28 Ghor	4701				4701
	29 Herat	10494				10494
	TOTALS	221524	0	0	0	221524

TABLE 1-7: TRIP TIME (DAYS)

		ORIGINS			
	DESTINATIONS	1 Peshawar	2 Quetta	3	4
N	1 Balkh	3.5			
	2 Fariab	6.3			
	3 Jawzjan	4.3			
	4 Samangan	2.9			
NE	5 Badakhshan	5.2			
	6 Baghlan	2.7			
	7 Kunduz	3.1			
	8 Takhar	3.6			
E	9 Kunar	1.6			
	10 Laghman	1.0			
	11 Nangrahar	0.7			
	12 Paktia	2.5			
EC	13 Bamyan	3.4			
	14 Ghazni	2.1			
	15 Kabul	1.4			
	16 Kapisa	1.7			
	17 Logar	2.0			
	18 Parwan	1.7			
	19 Wardak	1.6			
S	20 Helmand	4.8			
	21 Kandahar	3.8			
	22 Nimroz	7.8			
	23 Paktika	2.7			
	24 Uruzgan	5.5			
	25 Zabul	3.1			
NW	26 Badghis	8.0			
	27 Farah	6.5			
	28 Ghor	7.4			
	29 Herat	6.6			

Assumes km. per day on primary and secondary roads as shown below. Results represent weighted averages of road types for each origin-destination pair. All values calculated for a 2-way trip.

Km./day on primary roads	400
Km./day on secondary roads	200

TABLE 1-8: VEHICLE KILOMETERS (000)

		ORIGINS			
	DESTINATIONS	1 Peshawar	2 Quetta	3	4
N	1 Balkh	998			
	2 Fariab	0			
	3 Jawzjan	650			
	4 Samangan	956			
NE	5 Badakhshan	2904			
	6 Baghlan	6082			
	7 Kunduz	5109			
	8 Takhar	380			
E	9 Kunar	6849			
	10 Laghman	4601			
	11 Nangrahar	5714			
	12 Paktia	18035			
EC	13 Bamyan	0			
	14 Ghazni	16174			
	15 Kabul	2089			
	16 Kapisa	0			
	17 Logar	11691			
	18 Parwan	1976			
	19 Wardak	317			
S	20 Helmand	16047			
	21 Kandahar	38664			
	22 Nimroz	18160			
	23 Paktika	14967			
	24 Uruzgan	5412			
	25 Zabul	3369			
NW	26 Badghis	7199			
	27 Farah	27563			
	28 Ghor	6994			
	29 Herat	27726			
	TOTALS	250627	0	0	0

TABLE 1-9: VEHICLE DAYS (000)

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	2.5				2.5
	2 Fariab	0.0				0.0
	3 Jawzjan	1.6				1.6
	4 Samangan	2.4				2.4
NE	5 Badakhshan	9.3				9.3
	6 Baghlan	15.2				15.2
	7 Kunduz	12.8				12.8
	8 Takhar	1.1				1.1
E	9 Kunar	24.2				24.2
	10 Laghman	12.9				12.9
	11 Nangrahar	14.3				14.3
	12 Paktia	53.6				53.6
EC	13 Bamyan	0.0				0.0
	14 Ghazni	40.4				40.4
	15 Kabul	5.2				5.2
	16 Kapisa	0.0				0.0
	17 Logar	34.8				34.8
	18 Parwan	4.9				4.9
	19 Wardak	0.8				0.8
S	20 Helmand	42.1				42.1
	21 Kandahar	96.7				96.7
	22 Nimroz	58.1				58.1
	23 Paktika	42.5				42.5
	24 Uruzgan	19.7				19.7
	25 Zabul	8.4				8.4
NW	26 Badghis	19.7				19.7
	27 Farah	73.1				73.1
	28 Ghor	35.0				35.0
	29 Herat	69.3				69.3
	TOTALS	700.7	0	0	0	700.7

TABLE 1-10: VEHICLES REQUIRED

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	11	0	0	0	11
	2 Fariab	0	0	0	0	0
	3 Jawzjan	7	0	0	0	7
	4 Samangan	11	0	0	0	11
NE	5 Badakhshan	47	0	0	0	47
	6 Baghlan	69	0	0	0	69
	7 Kunduz	58	0	0	0	58
	8 Takhar	5	0	0	0	5
E	9 Kunar	128	0	0	0	128
	10 Laghman	62	0	0	0	62
	11 Nangrahar	65	0	0	0	65
	12 Paktia	261	0	0	0	261
EC	13 Bamyan	0	0	0	0	0
	14 Ghazni	185	0	0	0	185
	15 Kabul	24	0	0	0	24
	16 Kapisa	0	0	0	0	0
	17 Logar	170	0	0	0	170
	18 Parwan	23	0	0	0	23
	19 Wardak	4	0	0	0	4
S	20 Helmand	195	0	0	0	195
	21 Kandahar	441	0	0	0	441
	22 Nimroz	293	0	0	0	293
	23 Paktika	203	0	0	0	203
	24 Uruzgan	106	0	0	0	106
	25 Zabul	38	0	0	0	38
NW	26 Badghis	93	0	0	0	93
	27 Farah	341	0	0	0	341
	28 Ghor	240	0	0	0	240
	29 Herat	317	0	0	0	317
	TOTALS	3397	0	0	0	3397

RUN 2.

-FULL ACCESS TO EXISTING ROAD SYSTEM
-ALL CARGO ORIGINATING IN PESHAWAR.
-WHEAT AND FERTILIZER DISTRIBUTED ON BASIS OF ESTIMATED NEEDS IN EACH REGION (See text).
-OTHER CARGO DISTRIBUTED ACCORDING TO NUMBER OF EXTERNALLY-LOCATED REFUGEES ORIGINATING IN EACH PROVINCE.

RUN PARAMETERS: RUN NUMBER 2

1. Total Commodity Volumes (000 tons per year):

Wheat	500
Fertilizer	150
Other Dry Cargo	727
Fuel	700
Total	2077

2. Commodity Distribution by province:
Wheat and fertilizer based on estimated needs by province.
Other commodities in proportion to the number of external refugees originating in each province.

3. Origins of Commodities: all from Peshawar.

4. Vehicle Data:

	Average Capacity (tons per truck)	Average Km./day per Truck	Average Vehicle Availability
On Primary Roads:	10	400	60%
On Secondary Roads:	5	200	40%

Any of the numerical parameters in this box can be changed, and the new results will show immediately on recalculation (Key F9).

TABLE 2-1: REFUGEES BY PROVINCE

	PROVINCE	Est. Pop'n, 1979 (000)	Refugees by Province of Origin, 1987/88 NWFP	Bal'n	Punjab	Iran	Total Refugees (000)	Total as % of Prov. Pop'n.	Total as % of Refugee Pop'n.
		(1)	(2)	(3)	(4)	(4)	(5)	(6)	(7)
N	1 Balkh	569	2	5	6		13	2.3	0.3
	2 Fariab	588					NA		
	3 Jawzjan	589			7		7	1.2	0.2
	4 Samangan	273	4	5	6		15	5.5	0.4
NE	5 Badakhshan	498	28				28	5.6	0.7
	6 Baghlan	494	52	5	47		104	21.1	2.7
	7 Kunduz	555	30	5	41		76	13.7	2.0
	8 Takhar	520		5			5	1.0	0.1
E	9 Kunar	250	223				223	89.2	5.9
	10 Laghman	811	223				223	27.5	5.9
	11 Nangrahar	746	389		10		399	53.5	10.5
	12 Paktia	498	314	16	19		349	70.1	9.2
EC	13 Bamyan	269					NA		
	14 Ghazni	647	264	96			360	55.6	9.5
	15 Kabul	1319	56		13		69	5.2	1.8
	16 Kapisa	346					NA		
	17 Logar	258	262	21			283	109.7	7.4
	18 Parwan	410	48		5		53	12.9	1.4
	19 Wardak	288		9			9	3.1	0.2
S	20 Helmand	518		135		20	155	29.9	4.1
	21 Kandahar	567	1	463	2		466	82.2	12.3
	22 Nimroz	104		17		100	117	112.5	3.1
	23 Paktika	245	266		2		268	109.4	7.1
	24 Uruzgan	444		11		40	51	11.5	1.3
	25 Zabul	179	1	48			49	27.4	1.3
NW	26 Badghis	234		3		40	43	18.4	1.1
	27 Farah	225				200	200	88.9	5.3
	28 Ghor	388		3		40	43	11.1	1.1
	29 Herat	769				192	192	25.0	5.1
	TOTALS	13601	2163	847	158	632	3800	27.9	100.0

Sources:

Columns 1 to 7: derived from English, Richard,"Preliminary Report on Conditions Affecting the repatriation of Afghan Refugees", prepared for the United Nations High Commissioner for Refugees, 20 June 1988. Number of refugees does not include an estimated 300,000 unregistered refugees. Population estimate does not include approximately 300,000 nomads.

TABLE 2-2: DISTRIBUTION OF COMMODITIES BY PROVINCE

	DESTINATIONS	COMMODITIES: TONS (000) Wheat	Fert-ilizer	Other Dry	Fuel	TOTALS
N	1 Balkh	0.0	2.8	2.5	2.4	7.7
	2 Fariab	0.0	0.0	0.0	0.0	0.0
	3 Jawzjan	0.0	1.5	1.3	1.3	4.1
	4 Samangan	0.0	3.2	2.9	2.8	8.8
NE	5 Badakhshan	0.0	3.5	5.4	5.2	14.1
	6 Baghlan	0.0	13.2	19.9	19.2	52.2
	7 Kunduz	0.0	9.6	14.5	14.0	38.2
	8 Tokhar	0.0	0.6	1.0	0.9	2.5
E	9 Kunar	29.9	3.6	42.7	41.1	117.3
	10 Laghman	29.9	3.6	42.7	41.1	117.3
	11 Nangrahar	53.5	6.5	76.3	73.5	209.8
	12 Paktia	46.8	5.7	66.8	64.3	183.5
EC	13 Bamyan	0.0	0.0	0.0	0.0	0.0
	14 Ghazni	97.7	18.8	68.9	66.3	251.7
	15 Kabul	18.7	3.6	13.2	12.7	48.2
	16 Kapisa	0.0	0.0	0.0	0.0	0.0
	17 Logar	76.8	14.8	54.1	52.1	197.9
	18 Parwan	14.4	2.8	10.1	9.8	37.1
	19 Wardak	2.4	0.5	1.7	1.7	6.3
S	20 Helmand	11.2	6.3	29.7	28.6	75.7
	21 Kandahar	33.7	19.0	89.2	85.8	227.7
	22 Nimroz	8.5	4.8	22.4	21.6	57.2
	23 Paktika	19.4	10.9	51.3	49.4	130.9
	24 Uruzgan	3.7	2.1	9.8	9.4	24.9
	25 Zabul	3.5	2.0	9.4	9.0	23.9
NW	26 Badghis	4.5	0.9	8.2	7.9	21.6
	27 Farah	20.9	4.4	38.3	36.8	100.4
	28 Ghor	4.5	0.9	8.2	7.9	21.6
	29 Herat	20.1	4.2	36.7	35.4	96.4
	TOTALS	500	150	727	700	2077.0

Wheat and fertilizer distributed on basis of estimated specific requirement in each region. Distribution to the provinces within each region based on percentages by province of total region refugees.

TABLE 2-3: CARGO BY ORIGINS AND DESTINATIONS

(000 Tons)

		ORIGINS			
	DESTINATIONS	1 Peshawar	2 Quetta	3	4
N	1 Balkh	7.7			
	2 Fariab	0.0			
	3 Jawzjan	4.1			
	4 Samangan	8.8			
NE	5 Badakhshan	14.1			
	6 Baghlan	52.2			
	7 Kunduz	38.2			
	8 Takhar	2.5			
E	9 Kunar	117.3			
	10 Laghman	117.3			
	11 Nangrahar	209.8			
	12 Paktia	183.5			
EC	13 Bamyan	0.0			
	14 Ghazni	251.7			
	15 Kabul	48.2			
	16 Kapisa	0.0			
	17 Logar	197.9			
	18 Parwan	37.1			
	19 Wardak	6.3			
S	20 Helmand	75.7			
	21 Kandahar	227.7			
	22 Nimroz	57.2			
	23 Paktika	130.9			
	24 Uruzgan	24.9			
	25 Zabul	23.9			
NW	26 Badghis	21.6			
	27 Farah	100.4			
	28 Ghor	21.6			
	29 Herat	96.4			
	TOTALS	2077.0	0.0	0.0	0.0

TABLE 2-4: ROAD DISTANCES (KMS.)

	Province	Center	1 Peshawar			2 Quetta			3		
			Primary	Secondary	Total	Primary	Secondary	Total	Primary	Secondary	Total
N	1 Balkh	Mazar-e-Sh.	702		702	1137		1137			
	2 Fariab	Maymana	850	205	1055	792	455	1247			
	3 Jawzjan	Sheberghan	850		850	1285		1285			
	4 Samangan	Samangan	583		583	1332		1332			
NE	5 Badakhshan	Faizabad	585	230	815	1020	230	1250			
	6 Baghlan	Baghlan	535		535	970		970			
	7 Kunduz	Kunduz	615		615	1050		1050			
	8 Takhar	Taloqan	585	72	657	1020	72	1092			
E	9 Kunar	Asadabad	131	92	223	858	92	950			
	10 Laghman	Mehterlam	155	22	177	830	22	852			
	11 Nangrahar	Jelalabad	131		131	858		858			
	12 Paktia	Gardaiz	347	81	428	648	81	729			
EC	13 Bamyan	Bamyan	351	160	511	778	160	938			
	14 Ghazni	Ghazni	411		411	578		578			
	15 Kabul	Kabul	277		277	712		712			
	16 Kapisa	Mahmud Raqi	207	65	272	766	35	801			
	17 Logar	Puli Alam	277	65	342	648	30	678			
	18 Parwan	Charikar	341		341	778		778			
	19 Wardak	Maydan Shar	307	10	317	682	10	692			
S	20 Helmand	Lashkargah	879	45	924	350	45	395			
	21 Kandahar	Kandahar	759		759	230		230			
	22 Nimroz	Zaranj	879	342	1221	350	342	692			
	23 Paktika	Sharan	411	65	476	578	65	643			
	24 Uruzgan	Tarin Kot	411	340	751	230	145	375			
	25 Zabul	Qalat	629		629	360		360			
NW	26 Badghis	Qala Nau	1321	138	1459	792	138	930			
	27 Farah	Farah	1147	75	1222	613	75	688			
	28 Ghor	Chaghcharan		744	744	792	361	1153			
	29 Herat	Herat	1321		1321	792		792			

Provincial capitals used as provincial centroids.
Distances represent shortest route between points with maximum use of primary roads.
Distances are approximate.

TABLE 2-5: VEHICLE CAPACITY

(Average tons per truck)

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4
N	1 Balkh	10.0			
	2 Fariab	9.0			
	3 Jawzjan	10.0			
	4 Samangan	10.0			
NE	5 Badakhshan	8.6			
	6 Baghlan	10.0			
	7 Kunduz	10.0			
	8 Takhar	9.5			
E	9 Kunar	7.9			
	10 Laghman	9.4			
	11 Nangrahar	10.0			
	12 Paktia	9.1			
EC	13 Bamyan	8.4			
	14 Ghazni	10.0			
	15 Kabul	10.0			
	16 Kapisa	8.8			
	17 Logar	9.0			
	18 Parwan	10.0			
	19 Wardak	9.8			
S	20 Helmand	9.8			
	21 Kandahar	10.0			
	22 Nimroz	8.6			
	23 Paktika	9.3			
	24 Uruzgan	7.7			
	25 Zabul	10.0			
NW	26 Badghis	9.5			
	27 Farah	9.7			
	28 Ghor	5.0			
	29 Herat	10.0			

Assumes 10 tons per truck on primary roads and 5 tons on secondary roads. Results represent weighted averages by type of road for each origin-destination pair.

Capacity on primary roads (tons/truck): 10
Capacity on secondary roads (tons/truck): 5

TABLE 2-6: VEHICLE TRIPS REQUIRED

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	767				767
	2 Fariab	0				0
	3 Jawzjan	413				413
	4 Samangan	885				885
NE	5 Badakhshan	1637				1637
	6 Baghlan	5224				5224
	7 Kunduz	3817				3817
	8 Takhar	266				266
E	9 Kunar	14774				14774
	10 Laghman	12504				12504
	11 Nangrahar	20982				20982
	12 Paktia	20271				20271
EC	13 Bamyan	0				0
	14 Ghazni	25170				25170
	15 Kabul	4824				4824
	16 Kapisa	0				0
	17 Logar	21864				21864
	18 Parwan	3706				3706
	19 Wardak	639				639
S	20 Helmand	7761				7761
	21 Kandahar	22766				22766
	22 Nimroz	6647				6647
	23 Paktika	14053				14053
	24 Uruzgan	3221				3221
	25 Zabul	2394				2394
NW	26 Badghis	2266				2266
	27 Farah	10360				10360
	28 Ghor	4318				4318
	29 Herat	9640				9640
	TOTALS	221169	0	0	0	221169

TABLE 2-7: TRIP TIME (DAYS)

		ORIGINS			
		1	2	3	4
	DESTINATIONS	Peshawar	Quetta		
N	1 Balkh	3.5			
	2 Fariab	6.3			
	3 Jawzjan	4.3			
	4 Samangan	2.9			
NE	5 Badakhshan	5.2			
	6 Baghlan	2.7			
	7 Kunduz	3.1			
	8 Takhar	3.6			
E	9 Kunar	1.6			
	10 Laghman	1.0			
	11 Nangrahar	0.7			
	12 Paktia	2.5			
EC	13 Bamyan	3.4			
	14 Ghazni	2.1			
	15 Kabul	1.4			
	16 Kapisa	1.7			
	17 Logar	2.0			
	18 Parwan	1.7			
	19 Wardak	1.6			
S	20 Helmand	4.8			
	21 Kandahar	3.8			
	22 Nimroz	7.8			
	23 Paktika	2.7			
	24 Uruzgan	5.5			
	25 Zabul	3.1			
NW	26 Badghis	8.0			
	27 Farah	6.5			
	28 Ghor	7.4			
	29 Herat	6.6			

Assumes km. per day on primary and secondary roads as shown below. Results represent weighted averages of road types for each origin-destination pair. All values calculated for a 2-way trip.

Km./day on primary roads	400
Km./day on secondary roads	200

TABLE 2-8: VEHICLE KILOMETERS (000)

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	1077				1077
	2 Fariab	0				0
	3 Jawzjan	702				702
	4 Samangan	1032				1032
NE	5 Badakhshan	2669				2669
	6 Baghlan	5589				5589
	7 Kunduz	4695				4695
	8 Takhar	349				349
E	9 Kunar	6589				6589
	10 Laghman	4426				4426
	11 Nangrahar	5497				5497
	12 Paktia	17352				17352
EC	13 Bamyan	0				0
	14 Ghazni	20690				20690
	15 Kabul	2673				2673
	16 Kapisa	0				0
	17 Logar	14955				14955
	18 Parwan	2527				2527
	19 Wardak	405				405
S	20 Helmand	14343				14343
	21 Kandahar	34559				34559
	22 Nimroz	16232				16232
	23 Paktika	13378				13378
	24 Uruzgan	4837				4837
	25 Zabul	3011				3011
NW	26 Badghis	6613				6613
	27 Farah	25319				25319
	28 Ghor	6425				6425
	29 Herat	25469				25469
	TOTALS	241416	0	0	0	241416

TABLE 2-9: VEHICLE DAYS (000)

ROAD SYSTEM 1

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	2.7				2.7
	2 Fariab	0.0				0.0
	3 Jawzjan	1.8				1.8
	4 Samangan	2.6				2.6
NE	5 Badakhshan	8.6				8.6
	6 Baghlan	14.0				14.0
	7 Kunduz	11.7				11.7
	8 Takhar	1.0				1.0
E	9 Kunar	23.3				23.3
	10 Laghman	12.4				12.4
	11 Nangrahar	13.7				13.7
	12 Paktia	51.6				51.6
EC	13 Bamyan	0.0				0.0
	14 Ghazni	51.7				51.7
	15 Kabul	6.7				6.7
	16 Kapisa	0.0				0.0
	17 Logar	44.5				44.5
	18 Parwan	6.3				6.3
	19 Wardak	1.0				1.0
S	20 Helmand	37.6				37.6
	21 Kandahar	86.4				86.4
	22 Nimroz	51.9				51.9
	23 Paktika	38.0				38.0
	24 Uruzgan	17.6				17.6
	25 Zabul	7.5				7.5
NW	26 Badghis	18.1				18.1
	27 Farah	67.2				67.2
	28 Ghor	32.1				32.1
	29 Herat	63.7				63.7
	TOTALS	673.7	0	0	0	673.7

TABLE 2-10: VEHICLES REQUIRED

ROAD SYSTEM 1

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	12	0	0	0	12
	2 Fariab	0	0	0	0	0
	3 Jawzjan	8	0	0	0	8
	4 Samangan	12	0	0	0	12
NE	5 Badakhshan	43	0	0	0	43
	6 Baghlan	64	0	0	0	64
	7 Kunduz	54	0	0	0	54
	8 Takhar	5	0	0	0	5
E	9 Kunar	123	0	0	0	123
	10 Laghman	59	0	0	0	59
	11 Nangrahar	63	0	0	0	63
	12 Paktia	251	0	0	0	251
EC	13 Bamyan	0	0	0	0	0
	14 Ghazni	236	0	0	0	236
	15 Kabul	31	0	0	0	31
	16 Kapisa	0	0	0	0	0
	17 Logar	217	0	0	0	217
	18 Parwan	29	0	0	0	29
	19 Wardak	5	0	0	0	5
S	20 Helmand	175	0	0	0	175
	21 Kandahar	395	0	0	0	395
	22 Nimroz	262	0	0	0	262
	23 Paktika	182	0	0	0	182
	24 Uruzgan	94	0	0	0	94
	25 Zabul	34	0	0	0	34
NW	26 Badghis	85	0	0	0	85
	27 Farah	313	0	0	0	313
	28 Ghor	220	0	0	0	220
	29 Herat	291	0	0	0	291
	TOTALS	3262	0	0	0	3262

Based on estimated availability of:
60% on primary roads, and
40% on secondary roads.

RUN 3.

-FULL ACCESS TO EXISTING ROAD SYSTEM
-CARGO ORIGINATING IN PESHAWAR AND QUETTA.
-WHEAT AND FERTILIZER DISTRIBUTED ON BASIS OF ESTIMATED NEEDS IN EACH REGION,AS IN RUN 2.
-OTHER CARGO DISTRIBUTED ACCORDING TO NUMBER OF EXTERNALLY-LOCATED REFUGEES ORIGINATING IN EACH PROVINCE.
(Same as run 2, except cargo originates in Quetta in cases where Quetta provides shorter distance to the destination).

RUN PARAMETERS: RUN NUMBER 3

1. Total Commodity Volumes (000 tons per year):

Wheat	500
Fertilizer	150
Other Dry Cargo	727
Fuel	700
Total	2077

2. Commodity Distribution by province:
Wheat and fertilizer based on estimated needs by province.
Other commodities in proportion to the number of external refugees originating in each province.

3. Origins of Commodities: either Peshawar or Quetta, with selection of origin based on shortest distance to the destination.

4. Vehicle Data:

	Average Capacity (tons per truck)	Average Km./day per Truck	Average Vehicle Availability
On Primary Roads:	10	400	60%
On Secondary Roads:	5	200	40%

Any of the numerical parameters in this box can be changed, and the new results will show immediately on recalculation (Key F9).

TABLE 3-1: REFUGEES BY PROVINCE

	PROVINCE	Est. Pop'n, 1979 (000)	Refugees by Province of Origin, 1987/88 NWFP	Bal'n	Punjab	Iran	Total Refugees (000)	Total as % of Prov. Pop'n.	Total as % of Refugee Pop'n.
		(1)	(2)	(3)	(4)	(4)	(5)	(6)	(7)
N	1 Balkh	569	2	5	6		13	2.3	0.3
	2 Fariab	588					NA		
	3 Jawzjan	589			7		7	1.2	0.2
	4 Samangan	273	4	5	6		15	5.5	0.4
NE	5 Badakhshan	498	28				28	5.6	0.7
	6 Baghlan	494	52	5	47		104	21.1	2.7
	7 Kunduz	555	30	5	41		76	13.7	2.0
	8 Takhar	520		5			5	1.0	0.1
E	9 Kunar	250	223				223	89.2	5.9
	10 Laghman	811	223				223	27.5	5.9
	11 Nangrahar	746	389		10		399	53.5	10.5
	12 Paktia	498	314	16	19		349	70.1	9.2
EC	13 Bamyan	269					NA		
	14 Ghazni	647	264	96			360	55.6	9.5
	15 Kabul	1319	56		13		69	5.2	1.8
	16 Kapisa	346					NA		
	17 Logar	258	262	21			283	109.7	7.4
	18 Parwan	410	48		5		53	12.9	1.4
	19 Wardak	288		9			9	3.1	0.2
S	20 Helmand	518		135		20	155	29.9	4.1
	21 Kandahar	567	1	463	2		466	82.2	12.3
	22 Nimroz	104		17		100	117	112.5	3.1
	23 Paktika	245	266		2		268	109.4	7.1
	24 Uruzgan	444		11		40	51	11.5	1.3
	25 Zabul	179	1	48			49	27.4	1.3
NW	26 Badghis	234		3		40	43	18.4	1.1
	27 Farah	225				200	200	88.9	5.3
	28 Ghor	388		3		40	43	11.1	1.1
	29 Herat	769				192	192	25.0	5.1
	TOTALS	13601	2163	847	158	632	3800	27.9	100.0

Sources:

Columns 1 to 7: derived from English, Richard,"Preliminary Report on Conditions Affecting the repatriation of Afghan Refugees", prepared for the United Nations High Commissioner for Refugees, 20 June 1988. Number of refugees does not include an estimated 300,000 unregistered refugees. Population estimate does not include approximately 300,000 nomads.

TABLE 3-2: DISTRIBUTION OF COMMODITIES BY PROVINCE

	DESTINATIONS	COMMODITIES: TONS (000) Wheat	Fert-ilizer	Other Dry	Fuel	TOTALS
N	1 Balkh	0.0	2.8	2.5	2.4	7.7
	2 Fariab	0.0	0.0	0.0	0.0	0.0
	3 Jawzjan	0.0	1.5	1.3	1.3	4.1
	4 Samangan	0.0	3.2	2.9	2.8	8.8
NE	5 Badakhshan	0.0	3.5	5.4	5.2	14.1
	6 Baghlan	0.0	13.2	19.9	19.2	52.2
	7 Kunduz	0.0	9.6	14.5	14.0	38.2
	8 Takhar	0.0	0.6	1.0	0.9	2.5
E	9 Kunar	29.9	3.6	42.7	41.1	117.3
	10 Laghman	29.9	3.6	42.7	41.1	117.3
	11 Nangrahar	53.5	6.5	76.3	73.5	209.8
	12 Paktia	46.8	5.7	66.8	64.3	183.5
EC	13 Bamyan	0.0	0.0	0.0	0.0	0.0
	14 Ghazni	97.7	18.8	68.9	66.3	251.7
	15 Kabul	18.7	3.6	13.2	12.7	48.2
	16 Kapisa	0.0	0.0	0.0	0.0	0.0
	17 Logar	76.8	14.8	54.1	52.1	197.9
	18 Parwan	14.4	2.8	10.1	9.8	37.1
	19 Wardak	2.4	0.5	1.7	1.7	6.3
S	20 Helmand	11.2	6.3	29.7	28.6	75.7
	21 Kandahar	33.7	19.0	89.2	85.8	227.7
	22 Nimroz	8.5	4.8	22.4	21.6	57.2
	23 Paktika	19.4	10.9	51.3	49.4	130.9
	24 Uruzgan	3.7	2.1	9.8	9.4	24.9
	25 Zabul	3.5	2.0	9.4	9.0	23.9
NW	26 Badghis	4.5	0.9	8.2	7.9	21.6
	27 Farah	20.9	4.4	38.3	36.8	100.4
	28 Ghor	4.5	0.9	8.2	7.9	21.6
	29 Herat	20.1	4.2	36.7	35.4	96.4
	TOTALS	500	150	727	700	2077.0

Wheat and fertilizer distributed on basis of estimated specific requirement in each region. Distribution to the provinces within each region based on percentages by province of total region refugees.

Distribution of other commodities based on number of external refugees from each province, as in Run 1.

TABLE 3-3: CARGO BY ORIGINS AND DESTINATIONS

(000 Tons)

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	7.7				7.7
	2 Fariab	0.0				0.0
	3 Jawzjan	4.1				4.1
	4 Samangan	8.8				8.8
NE	5 Badakhshan	14.1				14.1
	6 Baghlan	52.2				52.2
	7 Kunduz	38.2				38.2
	8 Takhar	2.5				2.5
E	9 Kunar	117.3				117.3
	10 Laghman	117.3				117.3
	11 Nangrahar	209.8				209.8
	12 Paktia	183.5				183.5
EC	13 Bamyan	0.0				0.0
	14 Ghazni	251.7				251.7
	15 Kabul	48.2				48.2
	16 Kapisa	0.0				0.0
	17 Logar	197.9				197.9
	18 Parwan	37.1				37.1
	19 Wardak	6.3				6.3
S	20 Helmand		75.7			75.7
	21 Kandahar		227.7			227.7
	22 Nimroz		57.2			57.2
	23 Paktika	130.9				130.9
	24 Uruzgan		24.9			24.9
	25 Zabul		23.9			23.9
NW	26 Badghis		21.6			21.6
	27 Farah		100.4			100.4
	28 Ghor	21.6				21.6
	29 Herat		96.4			96.4
	TOTALS	1449.2	627.8	0.0	0.0	2077.0

TABLE 3-4: ROAD DISTANCES (KMS.)

		Province	Center	1 Peshawar			2 Quetta			3		
				Primary	Secondary	Total	Primary	Secondary	Total	Primary	Secondary	Total
N	1	Balkh	Mazar-e-Sh.	702		702	1137		1137			
	2	Fariab	Maymana	850	205	1055	792	455	1247			
	3	Jawzjan	Sheberghan	850		850	1285		1285			
	4	Samangan	Samangan	583		583	1332		1332			
NE	5	Badakhshan	Faizabad	585	230	815	1020	230	1250			
	6	Baghlan	Baghlan	535		535	970		970			
	7	Kunduz	Kunduz	615		615	1050		1050			
	8	Takhar	Taloqan	585	72	657	1020	72	1092			
E	9	Kunar	Asadabad	131	92	223	858	92	950			
	10	Laghman	Mehterlam	155	22	177	830	22	852			
	11	Nangrahar	Jalalabad	131		131	858		858			
	12	Paktia	Gardaiz	347	81	428	648	81	729			
EC	13	Bamyan	Bamyan	351	160	511	778	160	938			
	14	Ghazni	Ghazni	411		411	578		578			
	15	Kabul	Kabul	277		277	712		712			
	16	Kapisa	Mahmud Raqi	207	65	272	766	35	801			
	17	Logar	Puli Alam	277	65	342	648	30	678			
	18	Parwan	Charikar	341		341	778		778			
	19	Wardak	Maydan Shar	307	10	317	682	10	692			
S	20	Helmand	Lashkargah	879	45	924	350	45	395			
	21	Kandahar	Kandahar	759		759	230		230			
	22	Nimroz	Zaranj	879	342	1221	350	342	692			
	23	Paktika	Sharan	411	65	476	578	65	643			
	24	Uruzgan	Tarin Kot	411	340	751	230	145	375			
	25	Zabul	Qalat	629		629	360		360			
	26	Badghis	Qala Nau	1321	138	1459	792	138	930			
NW	27	Farah	Farah	1147	75	1222	613	75	688			
	28	Ghor	Chaghcharan		744	744	792	361	1153			
	29	Herat	Herat	1321		1321	792		792			

Provincial capitals used as provincial centroids.
Distances represent shortest route between points with maximum use of primary roads.
Distances are approximate.

TABLE 3-5: VEHICLE CAPACITY

(Average tons per truck)

	DESTINATIONS	ORIGINS 1 Peshawar	2 Quetta	3	4
N	1 Balkh	10.0	10.0		
	2 Fariab	9.0	8.2		
	3 Jawzjan	10.0	10.0		
	4 Samangan	10.0	10.0		
NE	5 Badakhshan	8.6	9.1		
	6 Baghlan	10.0	10.0		
	7 Kunduz	10.0	10.0		
	8 Takhar	9.5	9.7		
E	9 Kunar	7.9	9.5		
	10 Laghman	9.4	9.9		
	11 Nangrahar	10.0	10.0		
	12 Paktia	9.1	9.4		
EC	13 Bamyan	8.4	9.1		
	14 Ghazni	10.0	10.0		
	15 Kabul	10.0	10.0		
	16 Kapisa	8.8	9.8		
	17 Logar	9.0	9.8		
	18 Parwan	10.0	10.0		
	19 Wardak	9.8	9.9		
S	20 Helmand	9.8	9.4		
	21 Kandahar	10.0	10.0		
	22 Nimroz	8.6	7.5		
	23 Paktika	9.3	9.5		
	24 Uruzgan	7.7	8.1		
	25 Zabul	10.0	10.0		
NW	26 Badghis	9.5	9.3		
	27 Farah	9.7	9.5		
	28 Ghor	5.0	8.4		
	29 Herat	10.0	10.0		

Assumes 10 tons per truck on primary roads and 5 tons on secondary roads. Results represent weighted averages by type of road for each origin-destination pair.

TABLE 3-6: VEHICLE TRIPS REQUIRED

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	767	0			767
	2 Fariab	0	0			0
	3 Jawzjan	413	0			413
	4 Samangan	885	0			885
NE	5 Badakhshan	1637	0			1637
	6 Baghlan	5224	0			5224
	7 Kunduz	3817	0			3817
	8 Takhar	266	0			266
E	9 Kunar	14774	0			14774
	10 Laghman	12504	0			12504
	11 Nangrahar	20982	0			20982
	12 Paktia	20271	0			20271
EC	13 Bamyan	0	0			0
	14 Ghazni	25170	0			25170
	15 Kabul	4824	0			4824
	16 Kapisa	0	0			0
	17 Logar	21864	0			21864
	18 Parwan	3706	0			3706
	19 Wardak	639	0			639
S	20 Helmand	0	8030			8030
	21 Kandahar	0	22766			22766
	22 Nimroz	0	7592			7592
	23 Paktika	14053	0			14053
	24 Uruzgan	0	3089			3089
	25 Zabul	0	2394			2394
NW	26 Badghis	0	2332			2332
	27 Farah	0	10621			10621
	28 Ghor	4318	0			4318
	29 Herat	0	9640			9640
	TOTALS	156113	66464	0	0	222577

TABLE 3-7: TRIP TIME (DAYS)

		ORIGINS			
	DESTINATIONS	1 Peshawar	2 Quetta	3	4
N	1 Balkh	3.5	5.7		
	2 Fariab	6.3	8.5		
	3 Jawzjan	4.3	6.4		
	4 Samangan	2.9	6.7		
NE	5 Badakhshan	5.2	7.4		
	6 Baghlan	2.7	4.9		
	7 Kunduz	3.1	5.3		
	8 Takhar	3.6	5.8		
E	9 Kunar	1.6	5.2		
	10 Laghman	1.0	4.4		
	11 Nangrahar	0.7	4.3		
	12 Paktia	2.5	4.1		
EC	13 Bamyan	3.4	5.5		
	14 Ghazni	2.1	2.9		
	15 Kabul	1.4	3.6		
	16 Kapisa	1.7	4.2		
	17 Logar	2.0	3.5		
	18 Parwan	1.7	3.9		
	19 Wardak	1.6	3.5		
S	20 Helmand	4.8	2.2		
	21 Kandahar	3.8	1.2		
	22 Nimroz	7.8	5.2		
	23 Paktika	2.7	3.5		
	24 Uruzgan	5.5	2.6		
	25 Zabul	3.1	1.8		
NW	26 Badghis	8.0	5.3		
	27 Farah	6.5	3.8		
	28 Ghor	7.4	7.6		
	29 Herat	6.6	4.0		

Assumes km. per day on primary and secondary roads as shown below. Results represent weighted averages of road types for each origin-destination pair. All values calculated for a 2-way trip.

TABLE 3-8: VEHICLE KILOMETERS (000)

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	1077	0			1077
	2 Fariab	0	0			0
	3 Jawzjan	702	0			702
	4 Samangan	1032	0			1032
NE	5 Badakhshan	2669	0			2669
	6 Baghlan	5589	0			5589
	7 Kunduz	4695	0			4695
	8 Takhar	349	0			349
E	9 Kunar	6589	0			6589
	10 Laghman	4426	0			4426
	11 Nangrahar	5497	0			5497
	12 Paktia	17352	0			17352
EC	13 Bamyan	0	0			0
	14 Ghazni	20690	0			20690
	15 Kabul	2673	0			2673
	16 Kapisa	0	0			0
	17 Logar	14955	0			14955
	18 Parwan	2527	0			2527
	19 Wardak	405	0			405
S	20 Helmand	0	6344			6344
	21 Kandahar	0	10472			10472
	22 Nimroz	0	10507			10507
	23 Paktika	13378	0			13378
	24 Uruzgan	0	2317			2317
	25 Zabul	0	1724			1724
NW	26 Badghis	0	4338			4338
	27 Farah	0	14614			14614
	28 Ghor	6425	0			6425
	29 Herat	0	15270			15270
	TOTALS	111031	65586	0	0	176617

TABLE 3-9: VEHICLE DAYS (000)

ROAD SYSTEM 1

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	2.7	0.0			2.7
	2 Fariab	0.0	0.0			0.0
	3 Jawzjan	1.8	0.0			1.8
	4 Samangan	2.6	0.0			2.6
NE	5 Badakhshan	8.6	0.0			8.6
	6 Baghlan	14.0	0.0			14.0
	7 Kunduz	11.7	0.0			11.7
	8 Takhar	1.0	0.0			1.0
E	9 Kunar	23.3	0.0			23.3
	10 Laghman	12.4	0.0			12.4
	11 Nangrahar	13.7	0.0			13.7
	12 Paktia	51.6	0.0			51.6
EC	13 Bamyan	0.0	0.0			0.0
	14 Ghazni	51.7	0.0			51.7
	15 Kabul	6.7	0.0			6.7
	16 Kapisa	0.0	0.0			0.0
	17 Logar	44.5	0.0			44.5
	18 Parwan	6.3	0.0			6.3
	19 Wardak	1.0	0.0			1.0
S	20 Helmand	0.0	17.7			17.7
	21 Kandahar	0.0	26.2			26.2
	22 Nimroz	0.0	39.3			39.3
	23 Paktika	38.0	0.0			38.0
	24 Uruzgan	0.0	8.0			8.0
	25 Zabul	0.0	4.3			4.3
NW	26 Badghis	0.0	12.5			12.5
	27 Farah	0.0	40.5			40.5
	28 Ghor	32.1	0.0			32.1
	29 Herat	0.0	38.2			38.2
	TOTALS	323.7	186.6	0	0	510.3

TABLE 3-10: VEHICLES REQUIRED

ROAD SYSTEM 1

		ORIGINS				
	DESTINATIONS	1 Peshawar	2 Quetta	3	4	TOTALS
N	1 Balkh	12	0	0	0	12
	2 Fariab	0	0	0	0	0
	3 Jawzjan	8	0	0	0	8
	4 Samangan	12	0	0	0	12
NE	5 Badakhshan	43	0	0	0	43
	6 Baghlan	64	0	0	0	64
	7 Kunduz	54	0	0	0	54
	8 Takhar	5	0	0	0	5
E	9 Kunar	123	0	0	0	123
	10 Laghman	59	0	0	0	59
	11 Nangrahar	63	0	0	0	63
	12 Paktia	251	0	0	0	251
EC	13 Bamyan	0	0	0	0	0
	14 Ghazni	236	0	0	0	236
	15 Kabul	31	0	0	0	31
	16 Kapisa	0	0	0	0	0
	17 Logar	217	0	0	0	217
	18 Parwan	29	0	0	0	29
	19 Wardak	5	0	0	0	5
S	20 Helmand	0	84	0	0	84
	21 Kandahar	0	120	0	0	120
	22 Nimroz	0	215	0	0	215
	23 Paktika	182	0	0	0	182
	24 Uruzgan	0	42	0	0	42
	25 Zabul	0	20	0	0	20
NW	26 Badghis	0	60	0	0	60
	27 Farah	0	192	0	0	192
	28 Ghor	150	0	0	0	150
	29 Herat	0	174	0	0	174
	TOTALS	1543	906	0	0	2449

Based on estimated availability of:
60% on primary roads, and
40% on secondary roads.

APPENDIX III

ANALYSIS SYSTEM INSTRUCTIONS

APPENDIX III

ANALYSIS SYSTEM INSTRUCTIONS

1. Introduction

The analysis system is in two parts. Part 1 is a series of ten tables on Lotus 123 spreadsheets, designed to estimate the volume and distribution of cargo over the road system. Part 2 is a model for the estimation of vehicle operating costs.

2. Part 1: Spreadsheets

The spreadsheets each consist of an input or parameters box and ten tables. Examples can be seen in Appendix II to this volume. Any of the numerical inputs in the box can be changed, and the effects of the change or changes will work through the spreadsheet tables automatically when the spreadsheet is recalculated (Key F9). The volume of cargo to be distributed is defined in the input box. The tables are as follows:

Table 1-1: Refugees by Province. This shows the distribution of external refugees, which was the basis for the distribution of the commodities to the provinces in the first run of the system. Other criteria for commodity distribution can be defined by the user, as long as it results in the last column of Table 1-2 being completed.

Table 1-2: Distribution of Commodities by Province. Shows the estimated tonnage of commodities to each province based on the percentages of external refugees, or based on whatever other criteria are selected by the user.

Table 1-3: Cargo by Origins and Destinations. In the first run, it was assumed that all cargo originated in Peshawar, with destinations as shown in Table 1-2. There is provision for additional origins, requiring only that the formulas in the first column of the table be copied to the columns representing the additional origins.

Table 1-4: Road Distances. Shows the estimated road distance between each O-D pair, with the distances shown separately for the parts of each trip on primary and secondary roads. Peshawar was shown as the only originating point in Run 1 of the system. The addition of further origins or destinations requires that the applicable distances be added to Table 1-4.

Table 1-5: Vehicle Capacity. In the first run of the system, vehicle capacity was assumed to be 10 tons per vehicle on primary roads and 5 tons on secondary. This table consists of weighted average capacities derived from the road distances between each O-D pair and the proportion of the distance on primary and secondary roads in each case, as shown in Table 1-4. The capacities reflect the effects of road conditions and truck size. Different assumptions can be tested by simply changing the value of this parameter in the Run Parameter box.

Table 1-6: Vehicle Trips Required. This table is derived from the tons of cargo between each O-D pair (Table 1-3) and the vehicle capacities on the route from origin to destination (Table 1-5).

Table 1-7: Trip Time. The trip times are a function of the assumed kilometers per day on primary and secondary roads (400 and 200 respectively), the distance between each O-D pair, and the proportion of the distance on primary and secondary roads. The total times are somewhat understated as they include only running time, without allowance for unloading and other delays. The kilometers per day shown in the Parameter Box can be changed to test different assumptions regarding the distance travelled per day.

Table 1-8: Vehicle Kilometers. This is a product of the vehicle trips (Table 1-6) and the distances between each O-D pair (Table 1-4).

Table 1-9: Vehicle Days. This is a product of the vehicle trips (Table 1-6) and the trip time in days between each O-D pair (Table 1-7).

Table 1-10: Vehicles Required. This is a function of the assumed vehicle availability (60 percent on primary roads and 40 percent on secondary) and the total vehicle days required to carry the annual cargo between each O-D pair.

The spreadsheets are on a floppy disk in Directory 123AFGN. Three runs were made, with a separate file for each run, designated as follows: MATRIXRI; MATRIXR2, and MATRIXR3. The parameters and assumptions for each run are described in Volume II, Section 5. In making an additional run of the system, it is necessary only to retrieve the file for one of the previous runs; save it under a different file name (e.g. MATRIXR4); change the run number, title and table numbers on the spreadsheet, and make the desired changes in the parameters. Copies of the disk are available through US AID, Islamabad.

The tables can be printed individually or in groups, as desired by the user. The print ranges used for the runs shown in Appendix II are as follows:

	Print Range
Page 1: Input Box and Table 1-1	A1..Z54
Page 2: Tables 1-2 & 1-3	AA1..AV50
Page 3: Tables 1-4 & 1-5	AW1..BU54
Page 4: Tables 1-6 to 1-8	BV1..CZ54
Page 5: Tables 1-9 & 1-10	DA1..DV52

The other tables shown in Volume II of the report are also included on the disk, so that they can be reproduced or revised by the users.

3. Part 2: Vehicle Operating Costs

The estimates of vehicle operating costs (shown in Table 6 of this volume, for example), were developed using the Vehicle Operating Costs (VOC) Model which is part of the model (HDM-III) which resulted from the World Bank's Highway Design and Maintenance Standards Study. The VOC Model, which is shown on the same floppy disk as the spreadsheets for illustrative purposes, includes a full set of operating instructions on the disk. The HDM-III model is available to users at a very moderate cost through the University of Florida College of Engineering, Transportation Research Center (McTrans), Gainesville, Florida.