

KINGDOM OF CAMBODIA

UNITED NATIONS CAPITAL DEVELOPMENT FUND

UNITED NATIONS DEVELOPMENT PROGRAMME

Project Proposal

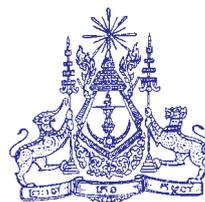
Roads Rehabilitation and Contractor Development Project CMB/96/C01

Prepared on behalf of

United Nations Capital Development Fund

by

Peter Bentall
Bjørn Johannessen
Avtar Singh



Phnom Penh, November 1995

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KINGDOM OF CAMBODIA

United Nations Capital Development Fund

United Nations Development Programme

PROJECT DOCUMENT

Number and Title	:	CMB/96/CO1 Roads Rehabilitation & Contractor Development	UNCDF: US\$ 3,500,000 UNDP: US\$ 2,503,250 Other:
Duration	:	3 years	Total: US\$ 6,003,250
Project Area	:	Battambang and Banteay Meanchey Provinces	
Sub-sector	:	Rural Infrastructure Development	
Executing Agency	:	UNOPS/ILO	
Starting Date	:	July 1996	
Counterpart Institutions	:	Provincial Rural Development Committees	
National Counterpart Inputs:		In kind	

Summary Description:

The project has two components (i) Local Rural Roads Fund with capital funding from UNCDF for the rehabilitation and maintenance of rural roads by labour-based Appropriate Technology and using small-scale local contractors to be trained under the project: (ii) Capacity Building with Technical Assistance funded by UNDP and provided under an Inter-Agency Agreement UNOPS/ILO, to provide advisory services to local government agencies to establish the capacity to plan, design and manage contracts for rural infrastructure development. The project lies within the framework of the CARERE 2 project for decentralised planning structure development.

On behalf of:	Signature	Date	Name/Title
Royal Government of Cambodia
United Nations Capital Development Fund
United Nations Development Programme

KINGDOM OF CAMBODIA

United National Capital Development Fund

United National Development Programme

Roads Rehabilitation and Contractor Development Project

PROJECT DOCUMENT

INTRODUCTION

This Project Document was prepared by a Project Formulation Mission to Cambodia undertaken in October/November 1995. Simultaneous discussions were being held on the formulation of CAREERE 2: the UNCDF LDF project: the Transitional Phase for CMB/92/008 (UNDP/ILO): and the Technical Assistance to Labour-based Rural Infrastructure ('Upstream' UNDP/ILO) project. Two of the Mission team had previous and on-going involvement in some of these discussions which was an advantage when trying to develop the essential linkages between the various projects. The Document outlines an experiment in decentralised funding for development projects which aims to match the decentralised 'bottom-up' planning structures which are the objective of CAREERE 2.

The project thus falls within the CAREERE 2 framework but, given the specific physical outputs required, it needs its own autonomous management organisation within the local government technical Departments if it is to be successfully implemented. Close coordination between all the projects is however of fundamental importance if all are to achieve their stated objectives since they are very much inter-dependent.

PART I: LEGAL FRAMEWORK

This Project Agreement (hereinafter called the Agreement) is the instrument referred to in the Basic Agreements between the Royal Government of Cambodia and the United National Development Programme (UNDP) signed on and the United National Capital Development Fund (UNCDF) signed on and is subject to the general terms and conditions set forth in these Basic Agreements.

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ADM	Area Development Manager (CARERE)
CARE	Cooperative for American Relief Everywhere
CARERE	Cambodian Resettlement and Rehabilitation Programme
CDC	Commune Development Committee
CRC	Cambodian Red Cross
CTA	Chief Technical Advisor
DDC	District Development Committee
EGP	Employment Generation Programme
EU	European Union
ILO	International Labour Organisation
IO	International Organisation
IMF	International Monetary Fund
ITC	Institute of Technology of Cambodia
KfW	German Aid Agency
LBAT	Labour-based Appropriate Technology
LBC	Labour-based Contractor
LDF	Local Development Fund
LRRF	Local Rural Roads Fund
MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
NGO	Non-governmental Organisation
NPRDC	National Programme to Rehabilitate and Develop Cambodia
PDRD	Provincial Department of Rural Development
PRDC	Provincial Rural Development Committee
PWD	Provincial Works Department
RGK	Royal Government of Cambodia
SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNCDF	United Nations Capital Development Fund
UNOPS	United Nations Office for Project Services
UNTAC	United Nations Transitional Authority for Cambodia
UNV	United Nations Volunteers
VDC	Village Development Committee
vpd	vehicles per day
WFP	World Food Programme

PART II - THE PROJECT

I General Information and Origin of the Project

1.1 Description of the Sub-sector

The sub-sector with which this project is concerned is rural infrastructure including secondary and tertiary roads; minor irrigation; drainage and flood control works; and social infrastructure including water supply and sanitation facilities: village schools and health clinics. While there is a widespread need for rehabilitation and new construction in all these areas, the road and irrigation sectors are of particularly high priority because of their fundamental relationship to rural development in Cambodia and the improvement of agriculture upon which some 80% of the population depends for its livelihood.

The Roads Sector

Cambodia is highly dependent on its road network for its internal transport and distribution system as well as its contacts with neighbouring countries. The past twenty years of war and neglect have badly damaged this infrastructure and in some cases have reduced operational capacity to a fraction of its original design. In addition to physical damage, implementation capacity has been greatly reduced by decimation in the staff ranks during the war years. Budgetary shortfalls are continuing to perpetuate the rundown condition of the transport system. Unless major improvements are undertaken in the short term, the system will deteriorate to a level at which complete reconstruction will be required.

The country's road network includes about 3,200 km of national (primary) roads, approximately 3,100 km of provincial (secondary) roads, and about 28,000 km of local (rural) or tertiary roads. Originally, about 2,400 km of the national road network was paved with asphalt or bituminous material, but over the years, through neglect and the effect of flooding and traffic, much of this pavement has disappeared. Presently, about 600 km of paved road remain with the balance surfaced with gravel or laterite. Except for Route 4 (Phnom Penh to Sihanouk ville), which was constructed to higher standards than other roads and remains in fair condition, about 60% of the pavements are in poor condition, as is about 80% of the laterite surfaced portion. This poor state of about two-thirds of the roadways produces major stress and wear on vehicles (as well as forcing uneconomically low speeds to be the norm.) At the same time, the vehicles cause increased damage and deterioration to the roads which, even if they were in good condition, were built to lower standards than required for the type, size and weight of the present traffic. Many of the country's 4,100 bridges were damaged or destroyed and have been repaired temporarily to permit passage but are inadequate or unsafe for present-day traffic. The low embankments generally in use (especially on provincial and local roads) lead to annual flooding, which produces isolation in many cases and extensive damage generally. The difficulty of travel in rural areas is a major obstacle impeding community development work in Cambodian villages by the Provincial Rural Development Departments and NGOs, which is crucial for strengthening the institutional framework for rural development.

The Irrigation Sector

Agriculture contributes about half of Cambodia's GDP and employs about 80% of the country's labour force. Rice is the most important crop, accounting for over 80% of total agricultural production. At present, approximately 16% of the cultivated area in Cambodia is irrigated in the classical sense of canals conveying water directly to fields from the source. There are presently 3 types of irrigation:

Wet Season Lowland Rice with Supplementary Irrigation (9%)

Dry Season Lowland Rice with Irrigation (2%)

Flood Recession Rice with Supplementary Irrigation (5%)

These irrigated areas currently account for approximately 30% of the total rice production of Cambodia. The amount of area that is used for multiple cropping is quite low however. This indicates the importance of having supplementary irrigation water for crop security, improved yields and for other uses. The UNDP Irrigation Rehabilitation study carried out in 1994 estimated that the present irrigated area could be doubled.

Some irrigation schemes which were developed in the early 1960s have been largely neglected and are currently in a deteriorated condition. During the late 1970s, under the Khmer Rouge an extensive network of canals, based on fixed one-kilometre gridlines, was implemented throughout the country but often without regard to natural contours and slopes. Many of the canals now function only as partial drainage systems. Weirs and other water control structures were also built to block flood waters in areas where double cropping might be possible. Many of these canals and structures were poorly designed, are in a deteriorated condition, have very limited function and often cause complex environmental problems, particularly those located in highly dispersive soils which are quite unsuited to conventional irrigation design methods.

Social Infrastructure

In rural areas of Cambodia safe drinking water supplies are very limited. UNICEF estimates that only 36% of Cambodia's population have access to safe drinking water and only 14% to adequate sanitation. As a consequence, a large part of the village population continue to resort to polluted sources, including rivers and open rain-catchment pools which easily become contaminated. Rural sanitation facilities are very inadequate where they exist at all and contribute to the water pollution problems. The incidence of water-borne diseases is correspondingly high.

The education system in Cambodia was virtually destroyed during Khmer Rouge period 1975 - 79. While progress is being made in the restoration, among many other problems facing the Government in this sector is the fact that many rural schools are in an advanced state of disrepair, and the number of classrooms is inadequate to accommodate the large increase in the school-age population that has taken place over the past 20 years. It is feared that illiteracy rates will increase if the situation is not improved quickly.

In the health sector, UNICEF estimates that only about 53% of Cambodia's people have access to adequate health services, and in many rural areas the percentage is no doubt lower. One of the reasons is the shortage of rural health clinics easily accessible to village people. Below the district level health care system is virtually non-existent.

The Rural Employment Situation

Although precise statistics on employment in Cambodia are not available (no census having been taken since 1962) it is universally recognised that underemployment and unemployment are major problems in the rural areas.

Cambodia has recently resettled more than 570,000 persons in rural villages, comprising returnees from refugee camps and internally displaced persons (IDP). The UNTAC operation which during 1992 and 1993 was employing up to 50,000 workers has terminated, leaving a large number of these workers unemployed. The proposed reduction of the Civil Service from its present estimated level of some 300,000 civilian, police and military personnel is expected to swell the number of people looking for jobs in both urban and rural areas. Many of those who are currently unemployed or under-employed are women heads of households (some 30 -35% of all households); handicapped persons injured by mines; and other disadvantaged groups. Unemployment is particularly high during the off-seasons in agriculture.

While it is recognised that the agricultural sector will continue to provide the major portion of employment opportunities in rural Cambodia for the foreseeable future, it is also clear that there are large numbers of unemployed persons who will not be absorbed by the sector in the short term, nor in the service and small industry sectors since the growth of these sectors of the rural economy will

be slow. As a consequence there is an urgent need for the immediate expansion of employment opportunities throughout the rural areas of the country.

The Role of Labour-Based Appropriate Technology (LBAT)

The dual need for infrastructure rehabilitation and immediate employment creation in Cambodia can be met to a significant extent through rural construction programmes using LBAT.

Labour Based Appropriate Technology (LBAT) is defined as the construction technology which, while maintaining cost competitiveness and acceptable engineering quality standards, maximises opportunities for the employment of labour (skilled and unskilled) together with the support of light equipment and with the utilisation of locally available materials and resources.

Labour Based Appropriate Technology contrasts markedly with the conventional practices of using capital and equipment-intensive construction technology which is often mistakenly assumed by some development decision makers to be the most appropriate and the most cost and quality effective, largely because they are the technologies used in industrialised countries.

In actual fact, numerous studies carried out by ILO and the World Bank in many countries, as well as ILO's field experience in Cambodia and elsewhere, demonstrate that when the right conditions are present in a given area, LBAT is the most cost-effective approach to rural infrastructure development. These conditions include (a) large numbers of under- or unemployed persons in the areas where the work is required plus local availability of construction materials; (b) a low-wage structure (under US\$4.00 per day according to World Bank studies); (c) shortage of conventional construction equipment and high capital costs; (d) small contractors skilled in LBAT technology and capable of supervising the work efficiently; and (e) competence of the public sector agencies responsible for rural construction in the areas of contracting and supervision of contractors' performance. Except for the last two, these conditions prevail in most rural areas of Cambodia, (where incidentally, the opportunity cost of unskilled labour has been found to be about US\$1.00 per work day, although there are seasonal variations with labour supply being at a premium during the sowing and harvesting periods of the agricultural cycle).

The experience gained by ILO under Project CMB/92/008 shows that the LBAT approach to rural infrastructure and maintenance is a feasible and cost effective strategy and acceptable to the rural population. Under this project over a 3-year period approximately 700 - 800 km of rural roads were rehabilitated or newly constructed in 6 provinces, in addition to irrigation and other works, generating and estimated 1.5 million work days, with a work force that was 60% female and also included many handicapped persons for whom special tools had been designed.

1.2 Government Objectives and Strategy for the Sector

The Cambodian Government's development strategy presented at the March 1994 ICORC meeting in Tokyo accorded high priority to agriculture and rural development, for both economic and strategic reasons, and this approach was supported by the international community. The Government's sectoral strategy embraces a number of linked objectives: (i) improved food security for the Cambodian population, with decreasing reliance on external food aid; (ii) reintegration of displaced Cambodians into the rural economy; (iii) more secure conditions for the occupation and improvement of agricultural land and for the marketing of agricultural products; (iv) improved infrastructure and social facilities in rural areas as a necessary input for increased agricultural production and rural income improvement; (v) better technical services, information, tools, and farm inputs to raise farm productivity; (vi) the rehabilitation of rubber plantations as an efficient source of income, employment, and foreign exchange, and (vii) the creation of an institutional capacity and knowledge base needed to prepare and implement long-term development strategies and investment programmes for the sector.

In the rural areas which are home to some 85% of the country's population, the goals are to:

- improve the quality of rural living by promoting rural development as a central feature of the Government's development priorities;
- ensure that the pattern of development is sustainable socially, politically, fiscally and environmentally; and
- rely to the maximum extent possible on private entrepreneurship and the market as engines of growth.

The ultimate goal is to alleviate the widespread poverty that presently prevails throughout the rural areas of the country, which in turn requires progressive economic growth, increased agricultural productivity and steady reduction of un- and under- employment and income generation in rural areas.

The development strategy recognises the important contribution that a labour-based approach to rural infrastructure rehabilitation and maintenance can make towards the above objective, and a Seminar held on this subject in March 1995 recommended the establishment of a Task Force to assist the Government to formulate and implement a national programme based on LBAT concepts.

This Task Force has now been established with members from 15 Ministries including the Ministries of Public Works, Rural Development, Agriculture, Labour and Social Affairs, Finance and Planning, with the mandate of establishing a National Strategy for the use of LBAT. This strategy is to include:

- ✓ The setting up of an LBAT unit in the relevant ministries to appraise projects and programmes in relation to the suitability of the LBAT approach;
- ✓ The development of a nationwide programme of LBAT rural roads;
- ✓ The integration of LBAT into irrigation programmes;
- ✓ The possible role of LBAT in the demobilisation process and in the reduction of the civil service;
- ✓ The links between the implementation of LBAT programmes and the promotion of micro enterprises in rural areas;
- ✓ How to develop training programmes for the supervisory and technical staff required for large scale application of LBAT;
- ✓ The integration of LBAT concepts into educational institutions such as the ITC;
- ✓ An evaluation of specific issues related to the use of LBAT such as remuneration, payment systems and procurement.

An 'upstream' project is intended to assist in the implementation of this strategy, in close collaboration with the UNDP/UNOPS CARERE-2 programme.

1.3 Institutional Framework for the Sub-Sector

The Government agencies chiefly responsible for the provision of rural infrastructure are the Ministry of Public Works and Transport (MPWT) and the Ministry of Rural Development (MRD).

According to the roads classification system recently proposed by the Cambodia Transport Rehabilitation Study, rural roads fall into the "secondary" and "tertiary" classification. The former are roads that link district centres to the national road system and to one another. The latter are intra-district and intra-commune roads.

The MPWT is responsible through its Provincial Departments for the construction and maintenance of secondary roads, while the MRD has recently assumed responsibility through its Provincial Departments, for the provision of tertiary roads. The MRD is currently endeavouring to build up its capacity to carry out this responsibility. At present, however, the existing limited Technical capacity in the country remains largely concentrated in the MPWT, and is almost

entirely taken up by the task of rehabilitating and maintaining the country's primary network comprising the main inter-provincial highways which are also badly deteriorated.

With regard to irrigation works, the Hydrology Department of the Ministry of Agriculture is involved in the planning and design of the works, with the MPWT responsible for the actual construction.

The private sector construction industry is dominated by a few large contractors, whose operations are mainly concentrated on the primary road network. Small private contractors find it difficult to enter the road sector because of the equipment investment required and the lack of a sufficiently large and predictable market.

Experience in other countries has shown that small contractors are the ones most qualified to employ LBAT approaches, and an important objective of the present project and CARERE is to foster development of the small contractor sector. A new and important development in Cambodia's institutional framework for rural development is the Government's recent decision to build up a decentralised and participatory planning structure, involving the establishment of hierarchically-linked development committees at the village, commune, district and provincial levels. This structure will have an important future impact on rural infrastructure and maintenance. The central objective of CARERE 2 is to build up the capacity of these committees at all levels along with the capacity of the Provincial Technical Departments, notably those of the MPWT and MRD.

A final feature of the institutional framework for rural infrastructure is the LBAT Task Force recently established by the Government and referred to above.

1.4 Counterpart Capacity in the Sub-sector

Government resources for the development of the rural infrastructure are severely restricted in human, material and financial terms. Aid agencies and NGO's are the main provider of development assistance which up until now has been mostly directed towards the emergency and short-term needs of the current situation.

Government Departments at both central and provincial level have little more than the basic resources to pay salaries (which are extremely low) and there is pressure to trim the size of the Civil Service across the board.

In addition the Ministry of Rural Development has only been in existence for about a year and is still in the process of building up its staffing capabilities.

It is expected that the provincial Departments of MPWT and MRD will identify the personnel resources which will enable them to take the lead role in the project implementation as the project progresses.

A substantial amount of capacity building at operational level has been achieved by the training programme of project CMB/92/008 through the secondment of government staff. The provincial authorities have been involved in the infrastructure works programmes of CARERE, ILO and other agencies and the technical capacity at that level has been noticeably strengthened. However, these projects have mainly been designed for direct execution by the donors and agencies without the government authorities being involved in direct managerial and financial/budgetary responsibility.

The experience of CMB/92/008 has shown that local authorities have the capacity to absorb the new technology and take on new responsibilities and it will be a major component of this project to ensure that this becomes more firmly established. The logical step is now to transfer the general management and financial control to the local authorities by developing effective management tools and providing purpose orientated training packages designed and closely linked to the road demands and working environments of the trainees.

1.5 External Assistance

Prior and On-going Assistance

The principal vehicles for assistance to the Government for the rehabilitation of rural infrastructure since 1992 have been 2 UNDP supported programmes, namely CAREERE, executed by UNDP/UNOPS, and the closely associated ILO-executed Employment Generation Programme which has been partly financed also by the Dutch Government.

The CAREERE Programme - the Cambodian Resettlement and Reintegration programme - was launched in mid-1992 by UNDP in partnership with UNHCR following the Paris Peace Accord. During its first phase (1992 - 1995) the programme has concentrated on the resettlement and reintegration into Cambodian society of the hundreds of thousands of refugees streaming back from the camps on the Thai border, as well as internally displaced persons. The emphasis of the programme during its early phase was on support for emergency-type quick impact projects aimed mainly at providing the basic rural infrastructure and essential services needed by the refugees and IDPs returning to their villages. The Programme has focused on 5 Provinces, namely Pursat, Battambang, Banteay Meanchey and Siem Reap in the Northwest and, since May 1995, Ratanakiri in the North.

As part of the CAREERE Programme, UNDP has also supported an Employment Generation Programme (EGP), executed by the ILO, comprising 3 separate projects:

- (i) Labour-based Infrastructure Rehabilitation Programme (CMB/92/008)
- (ii) Vocational Training for Employment Generation (CMB/92/020); and
- (iii) Small Enterprise and Informal Sector Promotion (CMB/92/010).

Total funding for these 3 projects has amounted to approximately \$9.3 million provided by UNDP, the Netherlands and UNHCR.

The first-named of these has rehabilitated rural infrastructure worth about \$10 million in the 5 northwestern provinces, comprising rural roads, irrigation and land reclamation works. Approximately 400 Km of secondary and tertiary gravel roads have been constructed and about 700 km maintained. Many of the works have been in the vicinity of Angkor Wat Temple complex, Cambodia's most important historical and religious centre, as well as tourist attraction. All these works have employed LBAT approaches.

In addition, the EGP has provided significant assistance in the area of capacity-building to enable government authorities at the central and local levels to assume responsibility for these activities in the future. Activities in this area have included:

- Formal training courses combined with on-the-job training for technicians and engineers covering management and implementation topics related to labour-based infrastructure works;
- Development of training materials and programmes covering labour-based appropriate technology integrated into the curricula of the Institute of Technology of Cambodia;
- Assistance in establishing the inter-ministerial LBAT Task Force to coordinate the efforts to enhance the use and effectiveness of labour-based appropriate technology for infrastructure works in the country;
- Initial efforts to involve domestic small-scale contractors in the execution of rural infrastructure works.

Planned Assistance

While important progress has been made in the areas described above, additional assistance is needed to build up the Government's capacity for rural infrastructure rehabilitation and

maintenance employing LBAT.

Support will be continued and coordinated under the second phase of the CARERE programme, with the support of the project described in this document. The strategy is explained in detail in Section 3.2.

In support of rural infrastructure rehabilitation, UNCDF will finance a Rural Roads Fund in two of the Provinces covered by CARERE, namely Battambang and Banteay Meanchey. Through this Fund, capital assistance will be provided to the provincial authorities, as the clients, with the technical departments acting as the Engineers, or contract managers, and the private entrepreneurs, as the contractors. Before and during the execution of the road works, training will be provided to all three parties. This proposed project would aim at the rehabilitation of about 150 km and the maintenance of about 500 km over a period of three years (1996-1999) in the provinces of Banteay Meanchey and Battambang.

The government is also currently negotiating a loan with ADB to finance a rural development programme in six provinces of South-eastern Cambodia which will comprise a major component in which 600 km of rural roads will be rehabilitated and maintained. Similar to the envisaged UNCDF project, these project outputs will be achieved using LBAT involving local small-scale contractors, supervised and managed by local provincial authorities.

The World Bank is supporting the government in establishing a Social Fund which will provide a considerable source of funding for rural infrastructure developments, although this is to be centrally rather than locally managed.

In addition to the above, other bilateral and multilateral donors and NGOs, the main actors being WfP and CARE, are already involved or currently considering further support to labour-based rural infrastructure works programmes in the country.

1.6 Development Problems in the Sector and Causes

For a country which has suffered the traumas that Cambodia has experienced the major development problem in any sector is the scale of the immediate needs. Rural life is very dependent upon an effective rural infrastructure of access and irrigation, and the recent exceptional flooding has served to highlight this structural frailty as the primary road network has been severely disrupted by washouts, destroyed bridges and inundated low sections. The situation has been compounded in the rural areas where roads were in any case difficult to access in normal circumstances.

Although a considerable amount of aid and assistance has been forthcoming from outside agencies this in itself creates problems of coordination and duplication and, in the case of rural infrastructure, a multiplicity of standards and work methods, which have often lacked the necessary technical input needed for sustainability. Recent events have exposed the poorer examples of road construction while showing that those with a greater technical input (eg ILO and Action Nord-Sud) have survived remarkably well.

Although the emergency situation is by no means over it should now be possible to give more attention to effective coordination and planning at the provincial level, which is a primary objective of the CARERE 2 programme. One of the areas to be addressed is that of rural road standards and specifications and this has already been highlighted on the LBAT Task Force agenda.

1.7 Project Origin

The proposal for a project to develop small-scale local contractors for labour-based rural infrastructure works is a logical step forward from the on-going CMB/92/008. That project has firmly established the viability of the labour-based technology and led to the government's stated policy objective of expanding the application of the technology and at the same time encouraging

private sector participation whenever possible.

The basis for such a project is the success of similar projects elsewhere (mainly in Africa) since the first launch in Ghana in 1986. The approach has been tested and remains fairly standard with only the necessary local modifications as each project is formulated.

As a result of a recent study covering similar projects in six countries, some overall conclusions have been drawn. The two most important of which are:

- a considerable (and expensive) initial training input is required if contractor development is to be successful
- a sustainable workload far beyond the period of the project is required for the contractors to become effectively established

Experience has shown that successful Pilot projects have invariably attracted increased contractor interest and additional funding from donor sources. Based on this a well formulated project can be almost guaranteed its success whilst acknowledging that the initial cost may appear disproportionately high.

II Pre-Project Situation

2.1 The Project Area

Two of the five CARERE operational areas (Battambang and Banteay Meanchey) have been chosen initially as the project area although it is the clear intention, assuming the successful implementation and additional funding, to extend into the other provinces at a later stage.

Both the chosen provinces have ILO rehabilitation and maintenance work on-going and close working relationships have been developed, particularly with the local Department of Public Works. The needs for the continuing development of both secondary and tertiary (Department of Rural Development) roads is self-evident and the support structures and resources are available at least in Battambang. This makes it the logical place to base the project initially with activities extending into Banteay Meanchey after the first phase where they would be directed from Sisophon.

2.2 Target Beneficiaries

The direct beneficiaries are identified as:

- (i) technical and supporting staff in the public sector: project manager, engineers, technicians, foreman, gangleaders, storekeepers and accounts clerks
- (ii) technical and supporting staff in private contracting organisations as above
- (iii) policy makers, planners and administrators at district, provincial and central government levels
- (iv) domestic petty and small size contractors, who will receive a start in business and the skills needed to build successful contracting firms

Most of the above will participate in training courses, workshops, seminars and/or on-the-job training for which the project will provide inputs in the form of providing a complete training package.

Finally, the unemployed and under-employed rural workers and their families in the areas where the construction works will be carried out will benefit through the employment opportunities and cash income that will be generated as the project is implemented. The completed project will, in turn, contribute to the process of rural development by contributing to agricultural productivity, through improved irrigation works and expanding access of farm families to markets as well as to health, education and other social services, now severely inhibited by the lack of an adequate well-maintained transport system.

2.3 Problems to be Addressed by the Project

Together with the 'upstream' project this project is intended to address two major and closely inter-linked problems that Cambodia presently faces and which are serious obstacles to rural development and the consolidation of peace and stability throughout the country. The first of these is the badly deteriorated state of rural infrastructure generally, and the road network, in particular, especially the secondary and tertiary roads. The second problem is the high level of rural unemployment and under-employment which is a major cause of rural poverty. The present situation in both these areas has been described in Section 1.1. Both problems will be dealt with simultaneously by building up capacity in the concerned agencies, principally the MPWT and MRD for infrastructure rehabilitation and maintenance through the application of LBAT Technology within a well-defined national policy and strategy.

Towards the achievement of this objective the project will address the following specific problems.

- (i) The present limited technical and management capacity of the MPWT and MRD for quality

rural road construction. The construction of high quality roads that will last using LBAT approaches is no easy task. The problem is aggravated in Cambodia, including the northwestern provinces, by the prevalence of poor soils for the construction of embankments, as well as by the scarcity and often poor quality (high plasticity) of laterite deposits, plus the scarcity and spatial distribution of stone quarries and limited capacity of crushing plants. Systematic testing of materials and more stringent engineering supervision is needed if roads and other works are to be constructed to acceptable standards. Both the MPWT and MRD face a shortage of the trained technical personnel needed.

- (ii) The Provincial Departments also lack expertise and experience in planning, organisation and management of LBAT infrastructure projects, and accordingly need advice and training in contracting and bidding procedures, supervision of contractors' work, and evaluation of the projects. A major output of the upstream project will be technical guidelines, manuals and both formal and non-formal training materials in all aspect of LBAT construction and maintenance, for application in the training programmes which are a component of the contractor development project.
- (iii) A third problem to be addressed is the present shortage of small contractors available in the rural areas to undertake contracts for rural works and implement them to acceptable standards. This project will make systematic promotional efforts to identify potential entrepreneurs and develop a training programme to equip them with both the technical and business skills needed to create a sustainable enterprise. The Rural Roads Fund financed by UNCDF will support this effort by providing capital for test-road construction projects as part of the contractors' training, and subsequently the full-scale trial contracts.

2.4 Linkage to Development Plans

The project is clearly in line with the stated objectives of the Cambodian National Development Plan which targets both rural development, the encouragement of the use of the private sector, and the extended implementation of LBAT.

The UNDP is using the CAREERE project to focus its support to the rural areas through strengthening of the government institutions at the provincial level. CAREERE 2 lays particular emphasis on the establishment of democratic decentralised planning structures from the village level through to the province and concentrates on the capacity building and technical advisory services needed to achieve these objectives. A number of physical implementation projects will be complementary to these activities, within the CAREERE 2 framework, of which this project will be one.

There are a multiplicity of other programmes centred in the same operational area, many being undertaken by NGOS and other by bilateral donors and major agencies. CARE is operating a 300 km rural roads programme in Banteay Meanchey. KfW is about to start a similar project in Siem Reap and ADB has a \$25 million rural infrastructure in the Southern provinces. It is important that these efforts are well coordinated towards a similar technological approach so that maximum benefit may be gained from both LBAT and contractor development.

Both UNDP and the LBAT Task Force will have important roles to play in this respect.

III PROJECT RATIONALE

3.1 The Reasons for UNDP/UNCDF Assistance

UNDP/UNCDF assistance is required in the form of this project for a number of important reasons:

- (a) it allows the next logical step to develop from the successful ILO CMB/92/008 project
- (b) it will assist the smooth transition between force account and private sector operations
- (c) it will support the essential capacity building within provincial government departments
- (d) it will provide a practical environment for the Upstream project and LBAT Task Force recommendations
- (e) it will provide significant technical support to CARERE 2 which is UNDP's main vehicle for rural development programme
- (f) it should provide the springboard for small-scale contractor development to extend on a countrywide basis
- (g) it will directly contribute to poverty alleviation and employment generation

The project CMB/92/008 produced an estimated 1.5 million work days of employment supplementing the incomes of poor families by approximately \$1.5 million which was a significant contribution to household incomes. This project will provide a continuation of these direct benefits and, over the longer term, the roads, irrigation works and other rural infrastructure that will be rehabilitated will have important multiplier effects in terms of overall rural development upon which the reduction of poverty in Cambodia will ultimately depend.

The capital requirements for physical works will be needed to be matched with the appropriate technical assistance for this new departure in terms of private sector involvement and thus both UNCDF and UNDP participation are particularly relevant.

Based not only on its twenty years of experience in the development of labour-based construction technology but also on the specific success of the CMB/92/008 project it is logical to involve the ILO in the technical assistance for the project. In addition ILO is to provide similar assistance to the Upstream project and since the two need to be very closely linked overall management within the same organisation is the sensible approach.

3.2 Project Strategy

This project is intended to complement the CARERE 2 strategy for the joint support of the Government's overall rural development programme within the framework of the participatory planning structure that is being established in the country. The central objective of this joint effort is to build up the capacity of the Development Committees that are being formed and supporting the technical Departments for the planning, management and implementation of all rural development activities.

A basic approach of the ILO to the introduction and development of LBAT in public works programmes is to act at both policy and implementation levels, and the implementation strategy of this project will be closely coordinated with the activities of the Upstream project which operates at the policy level, which is important for the long-term survival of the LBAT approach in Cambodia.

The project will give a practical edge to the policies, standards, documentations etc determined in the Upstream project and, in turn, feed back the implementation implications based on the tested field experience. By this means a practically based LBAT will be developed for extensive use countrywide.

The various components of the project are:

- (a) the practical implementation of the 150 km of rural road rehabilitation and 500 km of roads being maintained,
- (b) capacity building for small-scale local contractors to enable them to continue a private sector based programme of rural infrastructure works,
- (c) capacity building for government technical departments in planning, managing and implementing rural infrastructure projects by contractors.

The strategy to achieve these objectives will be very much training orientated. The technical assistance component will be crucial since it needs to combine the capacity building, which is often a fairly prolonged process, with the achievement of physical, measurable, outputs within a specific schedule, which is a full-time concentrated task. Experience elsewhere shows clearly that these tend to be barely compatible activities which need separate personnel who need to develop cooperative working relationships.

By the following means the project will target the specific problems it aims to solve, through the field based assistance team working alongside its government counterpart Departments.

The capital works programme will be managed by the government at the Provincial level and technical, financial and administrative procedures will be established within relevant Departments of the technical line ministries as important planning and management tools for national staff involved in rural works programmes.

As an Upstream activity the Government will have formulated a national LBAT policy and strategy and improved its capacity to coordinate external assistance related to rural development programmes and established standards, procedures and guidelines related to work methods, organisation, geometrical design standards, quality and costs.

Furthermore, the Government will be in possession of a complete and standardised contracts management system for the effective use of domestic contractors to execute rural infrastructure works using labour-based work methods.

To achieve this goal, a comprehensive training programme will be developed for staff from both the private sector and government covering several categories of staff from engineers, technicians, supervisors to mechanics, accountants and clerks.

A road maintenance management system, with its inventories and road prioritisation procedures, will be an important tool for the Government at both local and central level enabling it to identify the requirements for capital and recurrent investments in this sector. Furthermore, it will be an effective identifier of needs for external assistance in order to sustain previous investments in this sector. The system will gain practical experience from use in the project.

The training package will be designed in such a way that emphasis is given to the use of local in-country training resources so that it can easily be repeated or replicated in other sectors or regions of the country.

The above results should also provide the Government the good governance and transparency required for the donor community to entrust the responsibility for future assistance to this type of development projects fully into the hands of the Government, i.e. facilitating the shift to provincial execution of other donor-funded projects.

IV PROJECT OBJECTIVE AND OUTPUTS

4.1 Development Objective

This should be similar to the Upstream project for which it is seen as an implementation arm:

To contribute to the sustainable economic development of Cambodia through the establishment of a comprehensive, integrated strategy for rural infrastructure development, relying to the extent possible on available private sector resources and thereby reducing the country's dependence upon external assistance in terms of staff, technology, equipment, materials and funding.

4.2 Immediate Objectives and Outputs

There are four Immediate Objectives of the project and a number of associated Outputs. These are set out in the Tables below:

<p style="text-align: center;">Objective 1</p> <p>By the end of the project period, a capacity will be established and operational within provincial technical departments to plan, design, implement and monitor road rehabilitation and maintenance works using the most cost effective construction technology: labour-based methods, primarily based on the use of locally available resources, and with the participation of the private sector construction industry.</p> <p style="text-align: center;">Outputs</p> <ol style="list-style-type: none">1.1 Provincial road engineers trained in selection, planning, design, implementation and management of contracts for road rehabilitation and maintenance by local small-scale contractors.1.2 Supervisory staff trained in the efficient planning, implementation, supervision and inspection of labour-based road rehabilitation and maintenance works carried out by the private sector.1.3 Routine and periodic maintenance programmes established and under implementation for the roads rehabilitated as well as previously rehabilitated gravel roads in the two provinces.1.4 As efficient system for contracts management tested and established within the PDRD and PWD. This will include tender procedures, contract documents, payment procedures.1.5 An effective monitoring and reporting system established complete from site level to headquarters describing up to date details on the performance of the contractors in terms of manpower, equipment and material inputs, productivities achieved and average cost per kilometre.

<p style="text-align: center;">Objective 2</p> <p>By the end of the project period a capacity will be developed and operational within the local private sector construction industry capable of rehabilitating and maintaining secondary and tertiary roads through the efficient use of labour-based appropriate technology.</p> <p style="text-align: center;">Outputs</p> <ol style="list-style-type: none">2.1 A well documented system for identification and selection of potential contractors developed and established within local government technical Departments.2.2 8 small-scale contracting firms and 50 petty contractors developed to operate effectively as labour-based road construction/maintenance enterprises.2.3 Approximately 25 supervisory staff from the road rehabilitation contracting firms trained in the efficient planning, execution and management of labour-based road rehabilitation works and 50 petty contractors for maintenance works.2.4 8 small-scale contractors and 50 petty contractors equipped with a set of hand tools and light equipment required for undertaking road rehabilitation and maintenance works, financed by private financial loan agreements.
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Objective 3

Improved access to and within the areas of the project determined in relation to the economic and social activities of the respective areas of influence.

Output

- 3.1 150 km of selected secondary and tertiary feeder roads rehabilitated and 500 km under regular maintenance in the two Provinces Battambang and Banteay Meanchey by contract using labour-based methods to a standard proving all weather access throughout the year.
- 3.2 Road selection and priority ranking criteria introduced based on road condition inventories, traffic counts and collection of socio-economic data.

Objective 4

Direct employment created through the rehabilitation and maintenance of the selected roads in the provinces and the conditions for sustainable long-term employment creation in agriculture, road rehabilitation and maintenance activities will be enhanced through increased economic activity.

Outputs

- 4.1 A total of about 700,000 work days of direct employment created during road rehabilitation and maintenance works undertaken by the private sector contactors.

V. DESCRIPTION OF THE PROJECT

5.1 Summary Description of the Project

The project consists of two main components.

- i) A "Local Rural Roads Fund" (LRRF)
- ii) A "Capacity Building" component

Technical Assistance is to be provided through an Inter-Agency Agreement between UNOPS and ILO, funded by UNDP.

The two provinces chosen for the project activities are Battambang and Banteay Meanchey but since it falls within the CARERE 2 framework which supports rural infrastructure also in Siem Reap and Pursat the project design is flexible enough to include some involvement with the latter if it is agreed as appropriate in the later stages.

The LRRF has the specifically defined outputs of 150 km of rehabilitated secondary and tertiary roads and up to 500 kms of such roads under regular routine maintenance. Neither the split between provinces nor the secondary/tertiary proportions have been identified and they will be dependent upon the actual planning priorities and involvement of other agencies in the roads field at the time of project implementation. However, it is expected that a fairly equal split between provinces will emerge with the major part of the works being on tertiary roads.

The LRRF will be carried out using small-scale Local Contractors (up to 8) who will be trained in labour-based rehabilitation during the initial phase of the project. Following this training the road works will be contracted out under fixed rate contracts for which the local provincial authority PRDC will be the Client with the appropriate technical Department acting as the Engineer.

A separate project account will be established for the payment of contractors (with the CARERE Area Development Manager being a co-signatory). Technical work will be certified by the Government Engineer (countersigned by the ILO Adviser). Regular and timely payments are essential and the procedures need to be as simple as possible.

Initially the training will be on a demonstration road site in Battambang with contractors from each province providing at least three supervisors each for the 5 - 6 month period. Subsequently, the work will be carried out simultaneously in both Provinces.

In full production each contractor may be expected to complete about 15 km of road rehabilitation per year with a labour force of around 150 workers.

In parallel with the road rehabilitation activities the routine maintenance organisation will be continued on the existing (ILO) roads under the present 'lengthman' arrangement. This operates on individual single page contracts and will be the basis for further development. Petty (labour-only) contractors will be trained to take responsibility for an appropriate number of 'lengthman' (from 5 - 15). For the proposed 500 km of roads about 50 petty contractors will be required. Other, mainly tertiary, roads and those rehabilitated under the project will be added to the maintenance list to complete the total of 500 km by the end of the project.

Given the current situation of government staffing resources at the provincial level the most logical local counterpart Project Manager initially will be the Provincial Director of Public and the Capacity Building component will be centred on his organisation but also including appropriate staff from the Rural Development Department. Regular formal sessions as well as on-the-job training will be given to a range of staff from engineers to accounts clerks in order to establish a Client and Engineer organisation capable of undertaking all the functions for the planning, design and contract administration of labour-based projects. The technical principles and administrative and financial procedures will have a wider application to rural infrastructure in general with only

certain items being roads specific.

The emphasis will be to show that a Client/Engineer requires experienced, highly competent staff to manage successfully private sector operations where contractors are always eager to exploit any weaknesses for their own financial gain.

The Technical Assistance team will act in an advisory and training capacity with the local CARERE Area Development Manager exercising a monitoring role on behalf of the funding agency (UNCDF).

Close links will be maintained with both the ILO Upstream project and the UNCDF Local Development Fund project which is targeting village and commune level activities but which will call upon the increasing technical capacity of the local technical Departments.

5.2 Detailed Project Description

5.2.1 Pre-project Activities

In view of the ongoing ILO project CMB/92/008 which has established the technology and trained in excess of 300 staff the start of the Contractor Development project would benefit enormously from a number of pre-project activities which will serve to provide a logical and smooth transition between the two projects.

- (i) Current ILO road rehabilitation and maintenance activities continue in all Provinces, under transitional phase arrangements, at present levels.
- (ii) In liaison with PRDC/CARERE, including specifically the Provincial Rural Development and Public Works Departments, the secondary and tertiary roads priorities for rehabilitation and maintenance are formulated, in the two targeted Provinces, out of the decentralised planning process.
- (iii) Information meetings/seminars are held in the two Provinces to explain to all interested parties the objectives and practical implementation of the project in its several components.
- (iv) Separate meetings are held with groups of potential contractors, after a general awareness exercise, to explain in detail the implications of involvement. Contractor selection questionnaires are circulated to all those expressing serious interest.
- (v) Negotiations take place with ACLEDA (or other suitable financial institution) regarding the details of the equipment loan agreements to be worked out for the contractors.
- (vi) ACLEDA assists in an initial screening of potential contractors to ensure that those selected for training will be creditworthy when the equipment loan agreements are initiated.
- (vii) Existing ILO project staff are identified for transfer to the new project for the various technical and administrative posts, including the National Professionals needed in the TA Team.
- (viii) Preparations are made for the initial training phase in Battambang including choosing as suitable road (based on convenient logistic and engineering criteria), location of office and training classroom and detailed engineering survey of the road.

- (ix) Current ILO rehabilitation works in Battambang are phased out sufficiently to allow the transfer of the existing equipment required for starting work on the demonstration road with two construction units, (target date 1st November 1996).
- (x) The local technical department staff (PDRD/PWD) required for counterpart and capacity building training within the project are identified and initially briefed.
- (xi) Meetings are held with village communities along the demonstration road to explain the activities and to enlist their full cooperation, particularly with respect to the engagement of labour for the work (minimum 300 required) and task work system.

As far as possible these activities should be carried out by current local ILO and Government staff but there may also be a need for short term consultants inputs. The great advantage of using existing staff is their intimate local knowledge and established working relationships at all levels.

5.2.2 General

Because of the close linkage the Chief Technical Adviser (ILO) to be Upstream project should provide technical guidance and advisory support to the project to ensure that outputs are realised according to national standards, systems and procedures approved by central government. He will coordinate all ILO support activities to the project and ensure that inputs are provided in a timely manner according to the work programme of the UNCDF project.

Technical assistance to the latter will be provided by an ILO team under an Inter-Agency Agreement (UNOPS/ILO). This will establish a 'sub-contract' situation which, in the field, will result in the ILO Project Adviser and the CARERE ADM being respectively the representatives of the two contracting parties each directly responsible to his own employer. The ILO Adviser will have the responsibility to assist and advise the government project manager to ensure the achievement of the project objectives while the CARERE ADM fulfils a monitoring role on behalf of the Client. A close and harmonious working relationship between them all will be essential for the successful outcome of the project.

The local ILO office responsible for both TA projects is in Bangkok and reporting to that office would be through the upstream project CTA for ease of coordination, administration and continuity.

Although some expatriates will be needed for the specialist positions in the TA team there is now a sufficient number of Cambodian engineers, trained on the current project, to take the positions of National Project Personnel (provided that they can be identified and engaged before they are lost to other agency projects).

The TA team will work in close physical and cooperative collaboration with the local technical Department staff of both ministries to encourage committed involvement in, and full responsibility for, the project.

5.2.3 Output Related Activities

Mobilisation and Preparation

Prior to the commencement of field operations the TA team will assist the government in the preparation activities, which will in turn be dependent upon how much has been achieved in the pre-project period. The objective will be to start the training programme at the end of Month 3 (to coincide with the finish of the monsoon). These preparatory activities will be:

- (i) Prepare necessary facilities at the training centre in Battambang including office equipment; storage rooms; classroom and training equipment. Accommodation

and catering facilities for guest lecturers, visitors and participants on seminars and short courses would be arranged.

- (ii) Brief the recruited National Project Personnel on their duties and responsibilities within the project and give any further specialist training if necessary.
- (iii) Prepare a first year road rehabilitation and maintenance programme comprising,
 - a priority list of roads. This initial selection will be made on technical and training needs criteria and socio-economic considerations
 - detailed road condition surveys
- (iv) Identify the necessary tools and equipment (from the ongoing ILO project) needed to establish the demonstration training site.
- (v) Prepare a detailed Workplan for the rehabilitation and maintenance activities; and the capacity building for the first project year.

Outputs 1.1 & 1.2

- Government counterpart engineers, technicians and inspectors will be trained together with the contractors staff in overall management, administration and control procedures for labour-based roadworks.
- Site supervisory staff for both groups will be trained in site management; administration; labour incentive schemes; work methods and technical aspects of road rehabilitation and maintenance. Approximately 20 supervisors from PDRD and PWD and 24 supervisors from the contractors will be involved.
- Government engineers will receive training in roads planning, based on socio-economic criteria; road traffic levels; development needs and technical specs; and project design; contract preparation and management.

Outputs 1.3

- Government staff will be introduced to the routine maintenance management procedures proposed by the central Ministries (an output of the Upstream project) and be assisted in working out their practical implementation.
- They will be assisted in preparing annual Workplans and budgets and the preparation and management of petty contracts for maintenance based on the established lengthman system.
- Roads in both Provinces currently under a routine maintenance system (by ILO and others) will be taken into the project and roads rehabilitated under the project will be added after completion.

Output 1.4

- Contract documentation and management procedures already under development by the LBAT Task Force will be tested and established within the PDRD and PWD, for both rehabilitation and maintenance.
- Government staff will be assisted in the initial implementation of the financial management and control of the contracts.

Output 1.5

- Government staff will be assisted in the overall management and planning process through the introduction of a monitoring and reporting system. This will cover physical progress; labour employment; contractor performance; road condition surveys; traffic counts, work productivities and costing.

Output 2.1

- Based on the initial experience of the contractor selection procedure through public awareness meetings; detailed questionnaires to interested companies; technical and financial assessment and subsequent performance a documented procedure will be established within local government organisations for future use.
- Local government officials will feed-back the experience to the central LBAT Task Force for consideration.

Output 2.2 & 2.3

- The TA team will assist in the choice of 8 small scale contractors (4 from each Province) for participation in the rehabilitation training programmes.
- The TA team will assist in assessing the tools and equipment needs of each chosen contractor, agree with all parties concerned the overall procurement requirements, and initiate the procurement process.
- Similarly approximately 50 petty contractors will be chosen, as the project progresses, for participation in the maintenance programme.
- The Training Adviser will be responsible for the overall management of the training programmes (which are set out in detail in Part III) and he will work in close collaboration with his government counterpart.
- Contractors will be trained in business management (book-keeping; budgeting; cost control; cashflow planning; material purchase; personnel and labour management; banking; labour regulations) and contract management (bidding and tendering; estimating; contract documents; variations; claims; payment procedures).
- Petty contractors will be trained mostly on-the-job.

Output 2.4

- Upon the successful completion of training 8 contractors will negotiate loan agreements with ACLEDA (or other chosen financial institution) for the appropriate items of equipment and tools required to establish each one for road rehabilitation contracts.
- Similarly 50 petty contractors will be equipped with appropriate tools for routine maintenance activities.

Output 3.1 & 3.2

- Under the two initial training phases (demonstration road and 4 km trial contracts) approximately 40 kms of rehabilitation works are completed in the two Provinces.
- Negotiated contracts are subsequently awarded to 6 selected contractors through the government technical Department for approximately 15 km of roads each, for completion in one year,
- Similarly 2 contractors are awarded periodic maintenance regravelling contracts of 15-20 kms for a one year completion.
- Government staff prepare further contracts for rehabilitation and maintenance to be awarded dependent upon available funding.
- The TA team assists in the progressive increase of petty contracts for routine maintenance works to cover 500 kms of secondary and tertiary roads, prepared by the PDRD and PWD.
- Government staff are assisted in carrying out road condition surveys, traffic counts and engineering assessments and advised on the selection and prioritisation of roads for the establishment of a provincial plan for secondary and tertiary roads.

Output 4.1

- The works are carried out using a balanced mix of labour and equipment with equipment only being used where labour would not be economic (hauling gravel: breaking rock: compaction).
- Labour is engaged by the contractors from local villages on the project roads with equal employment opportunities given to men and women, in close consultation with local community leaders.
- Government staff are assisted in the enforcement of labour and employment regulations with respect to the small-scale contractors.

5.3 Co-ordination and Linkages

General

There are numerous components in the overall rural development activities in the two targeted provinces and even more, ongoing or proposed, in most of the other areas of the country. Clearly the only link between all the activities is the Government of Cambodia represented by its institutions at central and provincial level. Although acknowledging that these organisations need building up and strengthening, the priority principle should be one of very close coordination at all stages of the project. To achieve the most effective utilisation of the resources to be provided by capital funds and technical assistance, it is important that all parties agree a common strategy related to coordination and cooperation to achieve common and individual objectives of the project components.

Functional Linkages

UNDP has decided that the provision of ILO technical assistance to the labour-based rural infrastructure rehabilitation and maintenance programme will be provided by two projects:

- (i) At *upstream* level the UNDP has agreed to finance ILO technical assistance focusing on support to the LBAT Task Force and ITC, the development of management tools such as technical design and work methods, contract management procedures, administrative and financial procedures and corresponding training programmes for the effective implementation of LBAT rural infrastructure works in Cambodia.
- (ii) At *downstream* level, ILO will provide training and technical advisory support to the implementation of labour-based rural infrastructure works (LRRF) within the framework of CARERE2 through the contractor development component.

A basic approach of the ILO to the introduction and development of LBAT in public works programmes is to act at both policy level and implementation level. The immediate recipients of the outputs produced by the upstream project will be the implementors of the physical work at the downstream level. The management tools and training programmes developed at central level will:

- assist local provincial authorities to plan, coordinate and supervise infrastructure works carried out by both the public and private sector, and
- assist local government in organising and conducting local training programmes for local authorities, NGOs and the private sector.

The rural infrastructure works carried out under the LRRF will provide the primary test grounds for the management tools developed at upstream level. The activities at downstream will also provide important feed-back to central level on requirements for further support in terms of staff, additional training, funding, revision of procedures, etc.

The involvement of this downstream project meets the upstream project when training of government staff and contractors is carried out. The rationale behind this overlapping is that it is

vital for the upstream project to monitor the training in order to assess the quality and effectiveness of the training documents developed. However, the intention is clear that the lead responsibility for staff training will remain at downstream level. The upstream project will provide technical support to the initial pilot training courses in order to

- (i) ensure correct and effective use of the training material,
- (ii) to monitor quality and effects of training programme development efforts and,
- (iii) provide vital information enabling the upstream project to modify systems and procedures and finalise the training packages. This linkage will ensure that the upstream support is catering for the real and full needs as identified for the downstream level.

Formal Linkages between ILO Components

The upstream ILO LBAT technical assistance has been designed to support the government in pursuing its goals in terms of sustainable development of the rural sector at national level. Its services will apply and benefit projects throughout the country.

The downstream ILO technical assistance to the LRRF is limited to the two Provinces of Battambang and Banteay Meanchey. Although the development activities of this project are of a pilot nature which will result in outputs which may later be replicated in other parts of the country, the immediate concern is to execute road works through the development of small-scale road contracting firms in the project area. Since the project area is within the same area where CAREERE is operating, UNDP has decided to provide the ILO technical assistance to the UNCDF road project through an interagency agreement between ILO and UNOPS/CAREERE.

The technical assistance team to support the UNCDF project is proposed to consist of,

- (i) one Project Adviser advising the provincial authorities (PRDC) on the overall implementation and supervision of all project activities both the road works programme and the preparatory training programme,
- (ii) a Training Adviser who will be responsible for planning, coordination and implementation of training activities at provincial level,
- (iii) a Maintenance Adviser and,
- (iv) three National Professional Engineers who will assist in the implementation of the road works as well as the training programme.

The UNCDF LRRF has been charged with a set of very specific outputs and objectives within a limited period of time. This will require a joint effort of the technical assistance team delivering the necessary advisory services as a package. Furthermore, it will require full and close support of the upstream ILO project to ensure effective coordination of the activities of the two projects, resulting in the timely delivery of related activities.

The upstream project will play an important role at central level through the provision of planning tools, management systems and corresponding training material which will be used by the downstream project. The Chief Technical Adviser of the upstream project will provide technical guidance and advisory support to the downstream project ensuring that outputs are realised according to national standards, systems and procedures approved by central government. The CTA will coordinate all ILO technical assistance activities of both projects and ensure that inputs are provided in a timely manner according to the work programme of the UNCDF road works programme.

The provincial government authorities (PRDC), through their technical Departments (PWD and PDRD) are responsible for the management of the LRRF using the resources (contractors and contracts management) developed under the Capacity Building component. All project activities will therefore require very close cooperation between government staff and the technical assistance

team at the implementation level.

Linkage to CAREERE

There is a fundamental difference in the objectives of CAREERE2 (decentralised planning structures) and the measurable outputs of the LRRF, and the ILO technical assistance at downstream level should be delivered as an integral package which has sufficient autonomy within the CAREERE framework to assist government in achieving these outputs.

Coordination of activities within the CAREERE programme should be done jointly by the CTA of the upstream project, the project manager of the UNCDF project, the ILO Project Adviser and the CAREERE management. Major issues related to the strategy and implementation of the project should be resolved through joint consultations with the ILO regional office in Bangkok which is the authority to which the ILO project staff are responsible.

Furthermore, it implies that the various team members will report to the ILO Project Adviser who coordinates the provision of services with the ILO Chief Technical Adviser of the upstream ILO technical assistance. It is recommended that the ILO Project Adviser reports through the ILO upstream CTA rather than directly to the ILO office in Bangkok.

Progress reporting of physical outputs in terms of training and road works implementation will be provided to CAREERE, MPWT, MRD and the Task Force Secretariat.

Figure 1 shows the links and lines of command between the various UN-agencies involved in the provision of assistance to the UNCDF project.

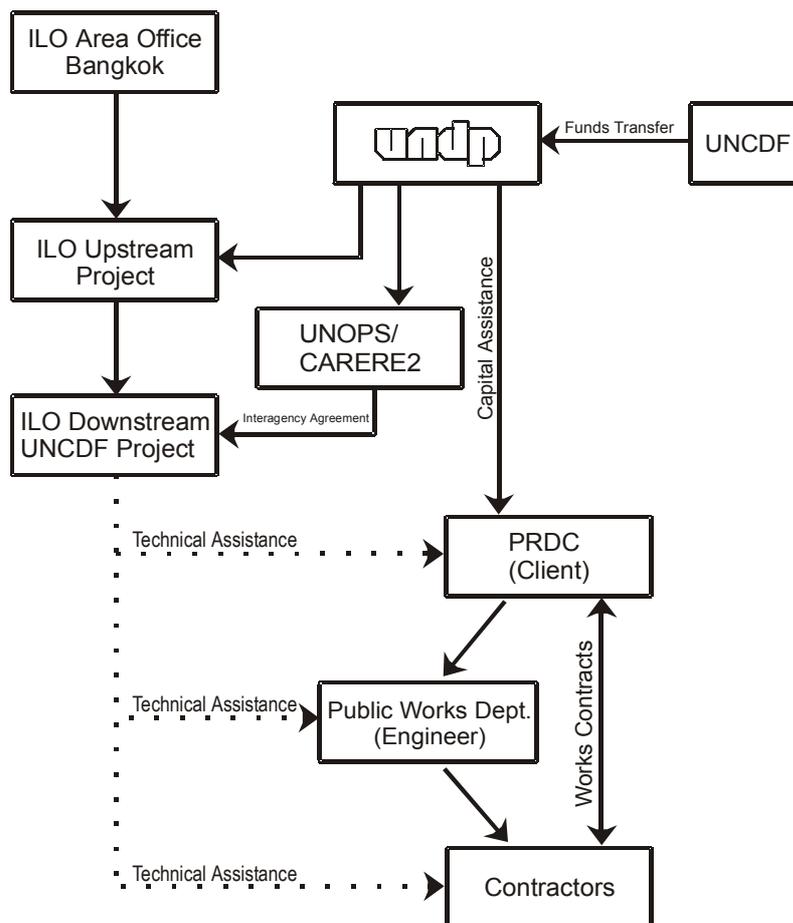


Figure 1 Linkage between UNCDF, UNDP, CAREERE and ILO

Finally, it should be mentioned that UNDP has requested the ILO to provide technical assistance to Pursat and Siem Reap provinces to cater for CARERE supported irrigation and rural road works. It is assumed that CARERE will wish to adopt the same approach and methodology for the works implementation as in the UNCDF supported provinces. Therefore it would be logical that this technical assistance is incorporated into the downstream ILO technical assistance team under the supervision of the ILO Project Adviser. Figure 2 describes the lines of command within the ILO technical assistance team and the lines of supervision.

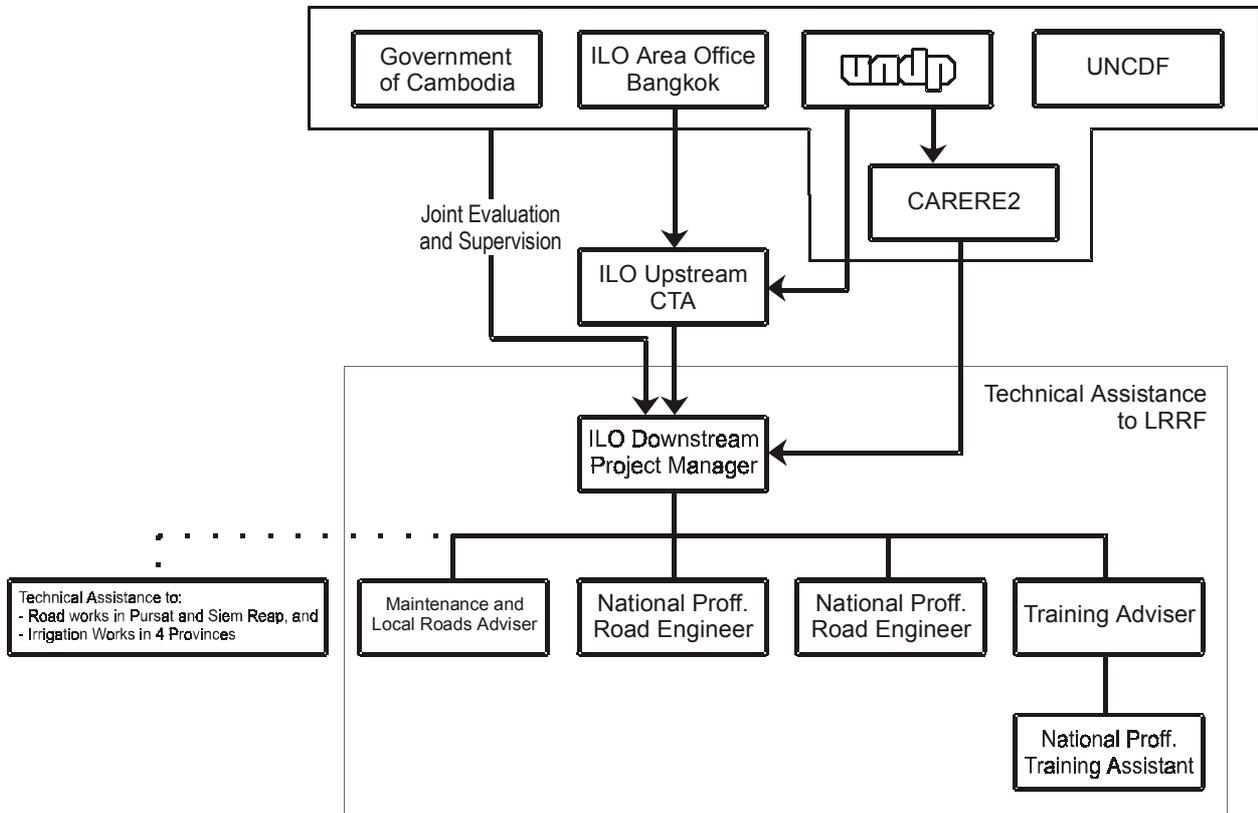


Figure 2 Organisation of ILO Technical Assistance

Linkage to Government Authorities

The Government implementation will be through the Provincial Works and Rural Development Departments in Battambang and Banteay Meanchey, initially the PWD has the better capacity to start the project.

Training clients would be extended not only to PWD and PDRD but also include the provincial planning units, and commune, district and village development committees. The PDRDs have already established a cooperation with the PWDs to build up the technical capacity in the PDRD by seconding staff to the PWDs to be trained in road construction and management. The training programme of this project will facilitate these initiatives by ensuring the staff on secondment from the PDRDs are involved in the training programmes. It is the stated intention that the PDRD capacity is to be built up by the transfer of trained staff from PWD over a period of time and the project will greatly assist in this aspiration. The objective will be for the PDRD to be able to take full responsibility for project management (on the tertiary road works) at the earliest possible opportunity.

Linkage to Other Programmes

Also involved in rural infrastructure development at village and commune level are

- UNCDF Local Development Fund (LDF)
- NGO agencies e.g. CARE: Action Nord-Sud: Concern:
- World Bank Social Fund of the Kingdom of Cambodia
- KfW: ADB and other bilateral donors (eg SIDA)

To the extent possible regular consultations should be coordinated under the auspices of the PRDC to ensure good planning; standards of construction; choice of technology; contracting procedures. At national level, coordination with other donor funded programmes of this nature will be secured through the LBAT Task Force.

VI Summary of Technical Assistance Inputs

To date, technical assistance for rural infrastructure development in the CARERE provinces has been provided by ILO within project CMB/92/008 and this has successfully trained over 300 staff of all categories, most of whom were seconded from their government technical Departments. If therefore, infrastructure activities were to continue on the present force account basis, there would be a fairly minimal need for continuing assistance.

The focus of national policy however is towards involvement of the private sector and this project aims to initiate the development of small-scale local contractors while simultaneously building capacity within local government to switch to the management of contract works rather than the usually easier alternative of direct labour. This will demand new skills being acquired by both groups since contractors can only survive by making profits and need to learn how to manage efficient construction in order to do so. For the government staff the commercial world is one of legal contractual obligations: deadlines and work schedules and contractors looking for ways to maximise income and profit which may not always be compatible with proper construction standards.

For contractors, labour-based construction can only be really profitable if well organised and managed in terms of labour input and productivity; and for supervisors generally a higher level of inspection is required than for equipment-based work. For contracts managers labour-based contracts are usually smaller and more numerous than those using equipment and thus the administrative workload is increased.

For these reasons technical assistance is required at a relatively concentrated level when contractor development projects are initiated since there is a large component of training involved. Technical assistance to this project can be summarised as follows:

- to assist and advise the government Departments in the implementation of the road rehabilitation and maintenance programme in Battambang and Banteay Meanchey Provinces.
- to train and develop local small-scale and petty contractors in road rehabilitation and maintenance using LBAT.
- to provide on-the-job training to provincial government staff on design, planning, contract management and daily supervision of the road rehabilitation and maintenance works using labour-based methods and utilising private sector contractors.
- to ensure proper implementation of administrative and financial procedures to allow the labour-based contractors to compete for and execute contracts effectively.

The proposed level of TA is:

Project Adviser	to be overall responsible for the 'downstream' advisory team and counterpart to the government Project Manager (LRRF)
Training Adviser	to be responsible for the contractor and government staff training programmes covering the full range of staff.
Maintenance Adviser	to assist in developing the routine maintenance capacity of petty contractors and government staff.

The team will coordinate their efforts to ensure, to the extent possible, that the specific project outputs of 150 km rehabilitation and 500 km routine maintenance are achieved.

A full description of the proposed training programme is included in Part III.

In addition to the above, it is proposed to use national professional technical staff to assist with the on-the-job advisory and training activities. Several engineers and technicians from the current ILO project have shown themselves capable of fulfilling this role and the initial intention is to engage three of them.

For administration of all the financial aspects of contracts management it is proposed to engage two national professional finance advisers to help both contractors and the government staff develop and monitor the necessary systems and procedures for financial control.

The professional technical assistance requirements may be summarised as follows,

Staff	Months
Experts:	
Project Adviser	36
Training Adviser	24
Maintenance Adviser	36
NPPP:	
Road Engineers (2)	72
Training Engineer	24
Finance Advisers (2)	72

This input will be supplemented by both short-term external and local consultancies for specific requirements such as specialist elements of the training programme. There will also be a full complement of support staff who are shown in the outline budget table.

VII Project Cost and Financing Plan

7.1 The current proposal for project funding may be summarised as follows:

- Government of Cambodia In Kind
- UNCDF Capital Funds for Equipment and Works
- UNDP Technical Assistance
- Other Donors To be sought

It needs to be stressed that the presently earmarked capital funding (about \$3.5 million) is sufficient for the specific project outputs but may leave the contractors with insufficient work for the full repayment of any equipment loans they may contract for their basic capacity building. Further funding both for continuity and for training contractors for the other provinces would need to be identified as soon as the project implementation has shown initial results.

7.2 UNCDF Capital Funds:

These may be summarised:

Equipment for Contractors (8)*	400,000
150 kms road rehabilitation (6 contractors)	2,155,000
500 kms routine maintenance (achieved by the end of the project)	375,000
Periodic Maintenance (2 contractors)	385,000
Missions/Contingencies	185,000
Total	3,500,000

* Under the proposed equipment loan arrangements Contractors would repay this capital (plus interest) over a 2 to 3 year period thus generating funding for spare parts: additional equipment or further contracts.

7.3 UNDP - Technical Assistance:

A detailed breakdown is shown in the Budget Table and totals \$2.5 million summarised as follows:

Project Personnel		
Experts & Consultants	105 W/M	120,000
NPPP & Consultants	183 W/M	183,000
Support Staff	486 W/M	162,000
Allowances/Travel and Missions		221,000
Training		167,000
Procurement & Equipment Operation		90,000
Miscellaneous/Reporting/Sundries		90,000
Cost Increases		115,560
Programme Support		274,690
	Total	<u>2,503,250</u>

7.4 Government of Cambodia: In Kind

The contributions in kind from the Government will be the personnel attached to the project, their basic salaries and allowances and office accommodation where possible for the project staff, within the technical Department or its compound (eg Battambang). This will be an important contribution to the essential principle of a close working relationship between project counterparts.

Other facilities, such as the use of provincial workshops, may also be available to support the project.

The main contribution will be, however, through the management of the capital works by the senior officials of government at the provincial level and specially the full support of the Governors.

7.5 Other Donors

The current ILO project has been supported by the Dutch Government and it is known that SIDA is also interested in funding rural infrastructure. SIDA elsewhere particularly supports labour-based construction projects and could be a potential donor. KfW is known to be commencing a project in Siem Reap and good co-ordination might secure some funding for training contractors for that province at some stage.

ADB has a \$25 million rural infrastructure project proposal for the South-eastern provinces and is committed to a labour-based approach. This is a potential future workload for trained contractors. Some additional work may also come from the UNCDF LDF project.

VIII Institutional Framework and Implementation Responsibilities

8.1 Institutional Framework

The project has two components:

- Local Rural Roads Fund and
- Capacity Building,

and the two are mutually dependent since capital funds alone cannot produce labour-based road works by contract as the technical capacity does not currently exist; and 'capacity' cannot be built unless there are physical works on which to develop the necessary practical experience and demonstrate the systems.

The overall decentralised planning and capacity building objectives of CARERE 2 will find some practical expression in the project but the co-ordination will need careful consideration if the necessary financial and administrative systems and procedures are to be in place under CARERE 2 for the effective implementation of the LRRF. This would apply particularly to the work on the tertiary roads.

It is fundamental to the project philosophy that the secondary and tertiary roads chosen for inclusion in the implementation programme emerge from the decentralised planning process, (the exception being the choice of the demonstration road). It may well be that the priority emphasis is judged to be the tertiary roads (and in any case, secondary roads are relatively few) but no choice can be made at the project formulation stage. Advisory assistance in this planning process is one responsibility of the technical assistance team.

The management of the LRRF funds will reside with the PRDC, of which the Governor is the Chairman, with the relevant technical departments (PWD or PDRD depending upon the road classification) undertaking the technical management of works implementation. Advisory assistance will be provided to the senior officials carrying out these roles by the technical advisers. At the working level, staff from both departments will be trained (as a single group) in all aspects of road construction and maintenance contracting and labour-based technology. Clear staffing policies will be established to enable the Departments, particularly the PDRD, to achieve sufficient capacity for the future management of these programmes. The following is a summary of the institutional framework:

- UNCDF: provides the capital funds for the roadworks and contractors equipment procurement. Construction and maintenance funds are channelled to provincial project accounts through the UNDP in Cambodia.
- UNOPS/
CARERE: provides the framework of co-ordination for the project components LRRF and Capacity Building and holds a monitoring brief and co-signatory responsibility for the disbursement of funds.
- UNOPS: and ILO sign an Inter-Agency letter of Agreement for the provision of Technical Assistance which involves advisory assistance and training for the LRRF and capacity building services to Clients, Engineers and Contractors.
- UNDP: provides the funding for the Technical Assistance component (in addition to the TA for the Upstream project)
- Government (PRDC) at Provincial level is responsible for the project management of LRRF with the necessary advisory support from ILO to its technical departments for the achievement of the specific project target outputs.
- PRDC: with the assistance of the CARERE 2 will establish decentralised planning procedures through VDC, CDC and District levels. ILO will assist specifically in the roads prioritisation planning process which will serve the implementation of LRRF.

- ILO will have the overall responsibility for all ILO activities in Cambodia, which include both Upstream and Downstream projects and will ensure that project objectives and specific outputs are fully complementary.
- UNOPS: undertakes the procurement of equipment for the contractors based on the advice of the project team and the specific requests of the contractors.

8.2 Implementation Responsibilities

Financial control will be exercised through a project account at the provincial level (but it should be noted that no other bank yet operates in Banteay Meanchey) for which the signatories will be the Governor (or his designated representative) and the CARERE ADM (as a representative of the funding agency). These accounts would operate as 'imprest' replenished on the basis of audited expenditure. Initially funds would be released from the PRDC directly to the technical departments as the works will be carried out under 'force account' type conditions (demonstration phase) and subsequently payments would be made directly to the contractors on the basis of interim certificates authorised by the appropriate technical Director and countersigned by the Technical Adviser.

Routine maintenance activities are already carried out by 'lengthmen', based on individual contracts, over nearly 300 km of roads in the two Provinces, and it is recommended that these, at least, are taken over by the project in the early stages as part of the maintenance component. Funding would be directed through the appropriate technical department (almost all these roads are tertiary). Petty contractors (controlling a number of lengthmen) will be developed during the project and the technical department staff will be trained in the different management requirements needed to effect this change.

The other component of capacity building involves the small-scale and petty contractors themselves and a major part of the responsibility for this will rest with the ILO Team who will make maximum use of local management expertise (accountants: financial managers: mechanical advisers: legal advisers: personnel managers) to assist in building the contractors management capacity.

The systems developed under these institutional and implementation arrangements must, above all else, ensure that contractors are paid on a very regular and timely basis strictly in accordance with the legal requirements of the Conditions of Contract.

As with all pilot projects of this nature, the practicalities in the field will develop within the overall framework and are always dependent upon the establishment of well co-ordinated working relationships between all parties. For this project, there are a number of specific examples of essential co-ordination.

- UNDP/ILO Upstream project produces outputs (road standards: simple contract documents: technical field manuals: contractor - oriented training materials: central policy agreement for LBAT implementation: labour regulations and conditions) in due time for inclusion in downstream (LRRF) implementation.
- UNDP/UNOPS/CARERE establishes flow of funds to ensure prompt payment of contractors for rehabilitation and maintenance works.
- UNOPS procures and delivers equipment for the contractors in time to enable contract schedule to proceed smoothly.
- CARERE (with others) establish the decentralised planning process to enable priority roads to be selected for the project.
- Government provides sufficient staff within the technical departments on a consistent basis for the capacity building component to be fully effective.

IX Plan of Operations:

A bar chart diagram outlining the proposed Plan of Operations is included in Part III.

The detailed schedule of activities is as follows:

A	Pre-project Activities	Month
A.1	Current labour-based road activities continue, under agreed transition phase arrangements, at present levels.	-6 to 0
A.2	Priority secondary and tertiary roads are chosen through the provincial planning process.	-6 to 0
A.3	Information meetings are held in two Provinces to explain the project.	-4
A.4	Potential contractors are identified through awareness campaign and selection questionnaires are circulated.	-3
A.5	Initial meetings are held with ACLEDA regarding equipment loan agreement arrangements.	-3
A.6	ACLEDA requested to assist with initial screening of contractors.	-2
A.7	Staffing requirements for the project worked out and local staff identified for all posts, including National Professionals for TA team.	-2
A.8	Preparations made for starting training phase in Battambang, including office/classroom location: choice of demonstration road: engineering survey: logistic planning.	-2 to 0
A.9	Programme to phase out current labour based operations in Battambang is prepared. Resources for transfer to project are identified.	-2 to 0
A.10	Local Technical Departments staff for counterpart and capacity building training are identified and briefed.	-2 to 0
A.11	Village/Community meetings are held on the chosen demonstration road to explain and request local participation.	-1 to 0
A.12	TA team members are recruited and briefed.	-3 to 0
B	Mobilisation and Preparation	
B.1	Arrival of TA team members in Cambodia. Initial briefing and mobilisation to Battambang.	1
B.2	Establishment of team with National Professionals and local counterparts. Assist local Project Manager to prepare detailed work programme. Assignment of staff and their tasks.	1
B.3	Preparation of facilities required for initial training phase office/classroom/accommodation: local procurements: logistic arrangements. mechanical support.	1 & 2
B.4	Establish the financing arrangements: local project accounts: flow of funds:disbursement procedures. Initiate first transfer of funds.	1

B.5	Arrange phased take over, to project control, of current labour-based routine maintenance activities by lengthman contractors.	2
B.6	Establish structured training schedule for Capacity Building programme including necessary data collection activities for the decentralised planning process.	2
B.7	Continue assistance to PRDC in the priority planning selection of secondary and/or tertiary roads.	2 to 6
B.8	Finalise selection of 8 Contractors for the training phase and work out administrative: financial: logistic arrangements for their participation.	2
B.9	Prepare detailed construction plan for the demonstration road including assessment of all required resources and associated training plan.	2 & 3
C	Training Phase 1	
C.1	Implement the rehabilitation works on the demonstration road as a training exercise for both contractors and government staff using labour-based technology with tools and equipment transferred from current project.	4 to 9 (6 months)
C.2	Discuss with selected Contractors their tools and equipment needs for full participation in the programme and beyond. Finalise total requirements and request procurement (through UNOPS).	5
C.3	Undertake programme of traffic counting and other socio-economic data collection for input into the road network planning process.	4 to 8 (5 months)
C.4	Hold meetings with potential maintenance petty contractors to assess interest. Initiate selection of first participants in the training programme.	4
C.5	Prepare and implement pilot petty-contractor training programme conducted in the local areas as site related exercise. Develop and continue the programme.	5 to 12 (8 months)
C.6	For roads prioritised in the PRDC planning process carry out engineering assessment of 8 x 4 km lengths, in both provinces, and prepare detailed workplans for contractors first Trial Contracts.	7
C.7	From observed productivities and work performance on the demonstration site prepare unit work rates for inclusion in the Trial Contracts.	7
C.8	Assess performance of contractors and government staff during training phase and award appropriate certificates of achievement to all participants.	8
C.9	Review experience of the first training programme and feed-back information and recommendations to the Upstream project.	8

D First Trial Period

- | | | |
|------|---|------------------------|
| D.1 | Award fixed price contracts (8 x 4 km) to contractors on a Trial basis in Battambang and Banteay Meanchey and give advisory and supervisory support. | 10 to 14
(5 months) |
| D.2 | Test and adapt government Department contract management procedures (particularly as regards payments) to ensure smooth administration of contracts. | 9 to 12 |
| D.3 | Assess the performance of the contractors during the Trials and select 6 for second full trials and 2 for periodic maintenance (regravelling) contracts. | 13 |
| D.4 | Review the unit work rates in the light of the experience of the Trials and recommend modification for second full trials. | 13 |
| D.5 | Finalise the roads priority planning process within PRDC and select roads in both Provinces for the full trials. | 10 |
| D.6 | Carry out engineering surveys and prepare 6 contracts for full trials in both Provinces and 2 for periodic maintenance. | 11 & 12 |
| D.7 | Take delivery of procured tools and equipment and assign to ACLEDA for onward distribution to the contractors. | 11 |
| D.8 | Assist contractors to agree equipment loan arrangements with ACLEDA. | 12 |
| D.9 | Increase the number of petty contractors for road maintenance through further training (target number 50) and maintenance implementation. | 9 to 12
(4 months) |
| D.10 | Continue capacity building of government staff in planning, design, contract management and site supervision including administrative and financial procedures. | 9 to 12
(4 months) |

E Full Contract Trial Period

- | | | |
|-----|---|-------------------------|
| E.1 | Award full 12 month fixed rate trial contracts (6 x 15 km) to chosen contractors in the two Provinces. | 16 |
| E.2 | Award full 9 month fixed rate trial contracts (2 x 18 km) for periodic maintenance. | 16 |
| E.3 | Assess capacity of government departments to award, supervise and manage contracts and undertake any additional training as necessary. | 13 & 14 |
| E.4 | Award full 12 month fixed rate routine maintenance contracts to trained petty contractors (target number 50). | 13 & 14 |
| E.5 | Manage all full rehabilitation; periodic maintenance and routine maintenance contracts. | 17 to 26
(10 months) |
| E.6 | Review and assess the progress and performance of the contractors; the systems and procedures for planning, design and contracts management. Recommend and feed-back to upstream project appropriate measures to improve overall performance. | 22 |

E.7	Prepare further rehabilitation; periodic and routine maintenance contracts according to remaining project funds to complete 150 km of rehabilitation and 500 km of maintenance (periodic and routine) on priority roads.	22 to 24 (3 months)
E.8	Prepare for a repeated training and implementation programme for new batch of contractors (if funding is secured) on the same basis.	21 to 24 (4 months)
E.9	Review and amend the unit work rates in the light of contractor performance and general cost increases.	24
E.10	Award further contracts based on available funding.	24 to 26
F	Final Period	
F.1	Complete new contracts for rehabilitation and regravelling and continue routine maintenance contracts.	28 to 36 (9 months)
F.2	Repeat the programme with new contractors from other provinces (funding permitting).	28 to 36 (9 months)
F.3	Review and assess complete programme and recommend future development of LBAT small-scale contracting.	30 to 33
G	Reporting: Monitoring: Review: Evaluation	
G.1	Hold regular project management progress meetings involving PRDC: PWD/PDRD: CARERE: ILO and, as appropriate, ACLEDA to review performance and recommend action.	Regular
G.2	Establish monthly reporting systems from site level through to project management detailing progress data and highlighting potential problems.	Monthly
G.3	Prepare and distribute quarterly monitoring reports to Government Ministries: LBAT Task Force: UNDP: UNOPS: UNCDF: ILO (Area Office), including financial statements.	Quarterly
G.4	Hold annual Tripartite Review Meeting to review progress and recommend future action.	Annual
G.5	Field a Project Evaluation Mission to undertake review and evaluation of project and recommend future developments.	33

The implementation of the project activities is the responsibility of the project management and clearly some of those detailed above will be largely delegated to others where a specialist expertise is called for, (eg Training: Procurement).

X Effective Date and Duration of the Project

This agreement shall enter into force upon signature by the Government of Cambodia, UNDP and UNCDF.

The duration of this Agreement for the purpose of availability of the UNDP and UNCDF contributions will be 3 years from the date it enters into force.

The duration of this Agreement for the purpose of reporting monitoring and evaluation of the impact of the UNDP and UNCDF contributions will be 3 years from the date it enters into force.

XI Reporting: Monitoring: and Evaluation

11.1 Monitoring Group

Reporting and monitoring of the project implementation should be on a regular basis and it is recommended that an in-country monitoring group is established that would meet every two months to review progress. This group should have representatives as follows:

- Government (PRDC: PWD/PDRD Project Managers: LBAT Task Force)
- CARERE (Local ADM)
- ILO (Project Adviser: Upstream project CTA) (as appropriate)
- UNDP (Local Representative)

11.2 Reporting

A Project Inception Report should be prepared by the Project Manager (in close collaboration with the Project Adviser) not later than 3 months after the start of the project. This should set out in detail the Workplan suitably amended after an assessment of the realities of the project environment (eg safe areas: resource availability: planning process).

Quarterly project progress reports should be prepared by the Project Manager with the TA team contributing on their own specialist areas of responsibility (eg Training: Capacity Building).

11.3 Monitoring

Monitoring field visits for the Technical Assistance component would be undertaken by ILO from the Bangkok Office coincident with those from the Upstream Project - These would be at no greater than 6 monthly intervals.

Tripartite Review Meetings would be held annually when project review and policy decisions would be taken. These would normally be immediately preceded by field visits UNCDF/ILO/UNDP to familiarise the parties with the up-to-date situation.

11.4 Evaluation

An Evaluation Mission should be fielded a minimum 3 months before the end of the project to complete an in depth evaluation which also assesses the initial impact of the project and outlines a strategy for future developments for labour-based contracting on a wider scale.

XII Project Budgets

UNCDF is providing the capital funding specifically for the rehabilitation of 150 km of road and maintenance operations on 500 km. Part of these funds will be used for the direct procurement of equipment to be used by the small-scale labour-based contractors. This equipment will be channelled through a financing institution (eg ACLEDA) and the cost (plus interest) repaid by the contractors over an agreed period (2 to 3 years). This repayment fund would be used by government to purchase spare parts, additional equipment or to fund further construction works. It is estimated that contractors will have repaid 80-85% of their loans by the end of the project period.

The UNCDF contribution totals \$3.5 million which is apportioned between the following budget lines.

(i) Procurement of Equipment	400,000
(ii) 150 km Rehabilitation Works	2,155,000
(iii) 500 km Maintenance Works	760,000
(iv) Monitoring and Evaluation Missions	85,000
(v) Contingencies	100,000
	<hr/>
	3,500,000

The detailed budget is included in Annex.1.

UNDP is providing funding for the Technical Assistance and this includes:

- Project Personnel: Experts: NPPP: Consultancies
- Administrative Support Personnel: Government Seconded
- Travel: Allowances: Missions
- Training: Fellowships Study Tours
- Local Procurement: Equipment Operation/Maintenance
- Miscellaneous/Reporting/Sundries

The detailed budget is included in Annex 1 and totals \$2,503 million.

In common with other similar projects where contractor development (with associated contracts management capacity) is the objective, the initial technical assistance input is high and can only be fully justified if continuity of the project (or, at least, workload for the contractors) can be predicted with reasonable confidence. Experience elsewhere over the last ten years suggests conclusively that this is a reasonable assumption but it has to be recognised as a potential risk for the project.

PART III PROJECT ANALYSIS

I Global Impact Assessment

Cambodia's return to democratic government is still very recent and most of the external aid that has been directed to the country has been for emergency situations. Returning refugees and internally displaced persons (IDP) have been a major target in the Provinces that UNDP through the CAREERE programme has been supporting. The emergency situation still persists and many NGOs and WFP are concentrating their efforts in the most needy, remote and often less secure areas. CAREERE has been operating only in a number of target zones in the chosen provinces both within an emergency programme and also with longer term development objectives.

The proposal for CAREERE 2 (from January 1996) places all the emphasis on decentralised capacity building for a 'bottom-up' approach to provincial planning, for rural development. A network of VDCs, CDCs and DDCs will be established for the planning and implementation (with whatever funding becomes available) of local development projects. Building up the necessary capacity to achieve this will be carried out over the CAREERE 2 project duration of 4 years. However, physical implementation of vital infrastructure needs to be continued at the same time with the main emphasis being the secondary and tertiary roads network.

A project CMB/92/008 has been operating in the CAREERE areas establishing the concept of the labour-based technology for rural roads construction and its success has led to a national policy being formulated to encourage its use. The LBAT Task Force has been formed to assist with the policy implementation. At the same time government wishes to encourage wherever possible the involvement of the private sector in development and thus the proposal for a labour-based contractor development programme is the next logical step.

Unusually, the CMB/92/008 has been directly managed by ILO due to the lack of basic government capacity, but it included within the implementation the training of over 300 various technical staff most of whom were seconded from government departments. Thus a basic capacity has been established and the new project can revert to the traditional arrangement of government management strongly supported by technical assistance. Since both the technology and the use of the private sector are relatively new concepts that assistance, in the initial stages, will need to be extensive, with a considerable emphasis on training and capacity building of both government and contractors personnel. UNCDF is providing capital funds for 150 km of secondary/tertiary roads and 500 km of maintenance work in two of the CAREERE provinces (Battambang and Banteay Meanchey).

Although the roads will only be identified as a result of the decentralised planning process being established through the CAREERE programme there is little doubt that the priorities will be seen as the poorest areas where refugees and returnees are being settled and given new land. Associated infrastructure (not only roads) is an urgent requirement and UNCDF also has the Local Development Fund (LDF) to support this objective.

By adopting a labour-based approach to construction a very large number of workdays of employment can be created and these will all fall to the local villagers who will be recruited (for a period of a few months) for the roadworks.

The completion of all-weather access to villages will greatly benefit general development and provide employment opportunities in maintenance work. Thus, whole communities will benefit directly or indirectly in many of the poorest areas.

The other direct beneficiaries are the contractors and their staff who learn new technical and management skills which will have wider application in the future. Contractors will receive that initial capital boost which is so necessary in the establishment of any new enterprise.

Government technical, administrative and financial staff will acquire the necessary skills to be able

to plan, design and manage works by contract which again will find wider application in other fields.

As a pilot project, there is a need to consider the sustainability and wider extension of its results and, given the stated national policy, and the known interest of major donors in supporting similar projects in other provinces, this objective looks reasonably secure. It is also the intention to engage some of the best of the local personnel trained under CMB/92/008 as National Professionals who will then benefit considerably from being involved within an International Organisation working with staff of considerable experience.

Quantitatively:

- ✓ about 700,000 workdays of employment for both men and women will be created.
- ✓ 8 contractors and their staff will be trained for labour-based road rehabilitation.
- ✓ 50 petty-contractors will be trained for routine maintenance operations.
- ✓ 20-30 Government staff will learn the skills of all aspects of contract works.
- ✓ 5/6 NPPP will gain valuable experience in working with international personnel.
- ✓ About 50 local communities will gain direct or indirect benefits from the construction works.

Although improved access cannot claim the credit for all socio-economic developments in any community it does play a significant part in

- ✓ Agricultural development and marketing.
- ✓ Social mobility and public transport.
- ✓ Security and policing.
- ✓ Education & health (access to schools/clinics).
- ✓ Visits from officials/extension workers.

In the context of rural Cambodia where many roads are impassable during the monsoon season (and often at other times) all-weather access is of vital importance both for daily survival and physical security.

II Technical Analysis

2.1 Road Standards

The recent exceptional flooding in Cambodia has severely tested the whole infrastructure network from the national roads, which were rendered impassable in many places with bridges and embankments destroyed, to the rural roads which were inundated with irrigation bunds and embankments being cut. However, as the flooding subsided it became clear that on the best constructed rural roads, built up on well compacted embankments and surfaced with good quality laterite, damage had been remarkably light in the circumstances. Many embankments had been cut (but this had saved the destruction of culverts) but their repair is a relatively simple operation. Long lengths of gravel surfacing remained almost unscathed and in other places some surface rutting could be fairly quickly repaired.

Technically, therefore, the construction standards adopted (in the absence of national guidelines) by, for example, ILO, Action Nord-Sud appear to have proved adequate for the low traffic levels on the rural (mostly tertiary) roads (10-20 vpd). It is those roads on which no compaction equipment was used, eg some Food for Work projects, where, not surprisingly, major problems occurred. This situation was confirmed by reports from the other CARERE provinces. Thus both the technology and the construction standards being currently used are judged satisfactory. It is also known that the LBAT Task Force will be considering standards for national adoption and may well have some

specific directives promulgated before the project starts, which would then be incorporated. It is unlikely that these will be significantly different since all are concerned to keep construction costs as low as possible.

The current standards 5 metre width with 150 or 200 mm compacted laterite surfacing on a well compacted embankment formation would be adequate (with regular maintenance) for traffic levels up to 100 vpd and in many places (depending upon laterite quality) up to 150 vpd. At this point construction costs become significantly more expensive with low-cost bituminous surfacings needing to be considered. It is recommended that the project is not involved with roads (potentially some secondary) on which traffic is at a 100 vpd plus level. In all areas roads are flat and straight and the embankments contribute to the general irrigation system which means that the construction of culverts and bridges (mainly short span) needs to be discussed with the Irrigation Department. Weirs and/or penstocks may need to be incorporated to regulate water flow.

2.2 Gravel Material

Gravel/Laterite is available only from the few isolated hillocks and average haulage is generally around 25 km, and therefore by truck. This operation is sub-contracted to local haulage transporters. The natural materials are of generally good quality if the clay content can be controlled to:

Liquid Limit not exceeding	35%
Plasticity Index	8 - 20%
Soaked CBR not less than	35%
% passing 0.425 Sieve	10 - 25%

For compaction testing and pavement/subgrade strength assessment extensive use should be made of the Dynamic Cone Penetrometer (PCP), which will make it easy to correlate passes of the roller with compaction achieved.

2.3 LBAT Data

All the LBAT data for the current project CMB/92/008 is contained in a number of project reports of which one of the latest is the Planning Report for the Norwestern Provinces (September 1995).

Most of the quantitative results compare very favourably with the experience from elsewhere and show that outputs, productivities, employment and costs are in line with the norms.

One difference is in the haulage of gravel (laterite) which shows up in the basic breakdown of labour, material and equipment costs. Supply of material may be up to 35% of the cost with hauls of greater than 25 kms.

Some basic average statistics are:

Average labour input	2700-5200	workdays/km
Labour cost range	3000-5000	USD/km
Overall cost (excluding equipment depreciation)	5600-8600	USD/km
Labour/Materials/Equipment breakdown (typical)	58/33/9	%

The project has evolved the optimum working Unit with associated light equipment which again correlates with experience from elsewhere. Since the construction is based on a compacted embankment the earthworks content is higher than many roads constructed by LBAT. However since gravel is delivered by sub-contract no labour is engaged in gravel quarries as it generally is elsewhere. Thus a labour force of 130-150 workers is fairly standard, which can both be conveniently managed and can achieve a productivity of around 1.5 km per month. On other projects 200-220 workers have produced in excess of 2,0 km per month but without the amount of earthworks needed in Cambodia.

2.4 Contractor Involvement

When LBAT moves into the private sector then contract prices will need to represent real costs which will include equipment depreciation: overheads and profit. These do not usually figure in traditional public authority direct labour accounting.

One major incentive for contractors to participate in this type of project and to persevere through the training is that of eventually owning their own equipment. It is the case that only the odd one or two firms have failed to perform in such projects elsewhere. Also ownership of equipment leads to a much more responsible approach to mechanical maintenance and thus utilisation and availability levels are high. Relying upon equipment hire, even if it is a practical alternative, is generally discouraging and less productive as the contractor loses control over availability, performance and mechanical condition. There is no evidence that a 'plant-pool' system has operated successfully in the rural areas of developing countries. Projects trying to operate on a 'shared plant' arrangement also run into serious problems.

The equipment proposed for the contractors is based on current experience in Cambodia (and elsewhere) and is judged adequate to ensure good (and profitable) productivity at optimum equipment utilisation. The total capital commitment for new plant would be around USD 64000 (which compares with 160.000 in Ghana and 95000 in Sierra Leone). A 2 year workload (at around USD 15000 per km) would be sufficient for the repayment with interest in 2 years, but a 3 year period would give more flexibility if the workload is assured.

The major equipment item is the vibratory roller and two are needed because of the continuous embankment construction and surfacing operations. Recommended minimum equipment is:

- 2 Pedestrian Rollers (950 kg)
- 1 Etean with water bowser
- 1 Pick-up
- 1 Set of Hand Tools
- 1 Motorcycle (125cc)
- 2 Bicycles

On the basis that gravel material will be supplied by sub-contractors' trucks.

These items do not allow much flexibility on spare capacity within the contractors operations and they should be considered the basic needs for establishing a viable and competitive small contracting enterprise.

2.5 Other Costs

It is not proposed to construct any new roads, only rehabilitation and maintenance on existing alignments and so no other costs eg land acquisition are envisaged.

Although in future the use of the private sector could be extended to cover local engineering consultants in the planning, design and contract supervision this is not seen as a practical option for this project since such capacity is non-existent at present.

2.6 Contract Documentation

The traditional contract documents for Civil Works are difficult to comprehend and unnecessarily comprehensive for the simpler type of contract which would be appropriate for labour-based construction. Some draft documentation has already been prepared for consideration by the LBAT Task Force and should be finalised before the project starts.

Documents for the provision of engineering and construction management services would be appropriate when the private sector becomes involved at that level.

2.7 Technical Assistance

The TA proposals are again based on experience gained on the current project CMB/92/008 and similar projects elsewhere. Three key elements are seen as crucial in the situation where both a new technology and new construction management approach (private sector) are proposed.

- Development of contracts management capacity (planning: design: construction)
- Training programmes for contractors and supervisory personnel at site level
- Development of Maintenance Contractors

Three advisers are proposed to assist in these areas together with national professionals to help supervise the site works and the day-to-day training programmes.

Based on the experience of other projects the training component input is generally underestimated and should not be combined with other responsibilities. Also on those projects where rehabilitation and maintenance have been coupled under one advisory input, the maintenance has failed to develop satisfactory. Currently, also contract maintenance already exists in both provinces and will need a concentrated effort to continue its development.

National professionals are recommended rather than UNVs since some are judged to have reached the appropriate level of competence and experience, apart from the obvious advantages of local knowledge and language.

It needs to be stressed that this technical assistance is judged necessary to fulfil the requirements of the project and will not be generally available to CAREERE for infrastructure advisory support in the other provinces - for which *additional* advisers will be needed.

2.8 Training

The detailed training programme proposals are set out in Annex 3 and the costs are included in the UNDP technical assistance budget table. These include the necessary training aids and equipment (some of which may be available from current projects): allowances and expenses for training personnel, trainees, visiting lecturers; production of some on-site training materials. Also included are the expenses for fellowships, study tours and short courses which would be additional to the local programmes.

2.9 Preparatory Works

The current situation with contract documents (in English and Khmer) has already been elaborated. In addition much training material already exists from other projects and also from the ongoing ILO project which has already been used extensively. Preliminary meetings have been held very informally with potential contractors in Battambang and Sisophon to introduce the project objectives and to assess the level of interest. There is no reason to believe that contractor participation will not be successful.

2.10 Project Areas

No areas of the two provinces should be considered as 'safe' but a continuous review of the security situation is carried out. CAREERE confines itself to the 'safer' areas but others operate on a wider basis. The situation is subject to change and cannot be forecast as far ahead as the start of the project. Security would be one factor in the planning process and roads eventually chosen would need to be subject to a demining exercise before any works were undertaken. This particularly applies to areas of gravel sources.

2.11 Road Reconnaissance

Most of Cambodia's road network is in a seriously deteriorated state, from the national (primary) links, much damaged by recent flooding, through the secondary roads which are important in the provincial context to the tertiary network which serves the communes and villages. Since the terrain is almost totally flat in the project areas the road construction needs are everywhere the same. Pavements need to be raised 0,5 to 1,0 metre on embankments above the irrigation water level to ensure a good foundation and to mitigate potential flood damage. This makes an assessment of the required engineering input and cost relatively simple (dependent largely on the gravel haulage distance). New drainage structures will be few. Some of the secondary roads in Battambang and Banteay Meanchey are already included in other programmes (eg CARE's 300 km project in Banteay Meanchey). The tertiary roads have been tackled by agencies such as Action Nord-Sud, DCC, Concern, CARERE/ILO, USAID/CARE, Cambodian Red Cross and much work is still ongoing. In some cases, there will be a need either to upgrade some of the existing construction or to regravels roads already in use for several years. In places a key secondary link needs rehabilitation to open up a local tertiary network. All these factors will be inputs to the planning process but there is clearly not shortage of need, as many areas become inaccessible during the rains.

2.12 Planning Process

Secondary roads are the legal responsibility of the central Ministry of Public Works and tertiary roads the Ministry of Rural Development. That responsibility at provincial level rests with the Directors of the respective Departments who report to their line Ministries. In addition they are both members of the PRDC which has responsibility for rural development planning at provincial level, and to which the Directors would bring the formulated national policy for roads development eg widths: standards: construction technology: specifications: documentation etc. Also the Ministry of Planning, through its provincial planning Directors has recently produced a 5 year Development Plan and 3-year PIP (Public Investment Programme) which now has Council of Ministers approval. The PIP lists all the approved projects for the next three years (funding permitting) and legally speaking all new project funding should be directed in accordance with that Programme. The PIP will however be subject to regular review. In the CARERE target zones the decentralised, 'bottom-up' planning process is being introduced through the continuing formation of Village, Commune, and District Development Committees (VDC: CDC: DDC). This will take over planning and implementation responsibilities from the existing structure of (non-elected) committees through which the (rudimentary) planning process is currently carried out. This present situation relies heavily on local officials being fully aware of local needs and priorities, rather than on democratic decision making.

Roads by their nature are rarely totally localised (any that are could fall under the LDF project) since their only use is when linked into a network, and thus roads planning needs to be viewed, not in isolation as a village pond or school might be, but in, at least, a District context. With the 'wishlists' and data collected from the VDC and CDC (of which none yet exists) the initial network planning would take place at DDC level before being forwarded for PRDC consideration.

In rural roads planning purely economic considerations (eg internal rate of return: cost/benefit) are not appropriate since the only measurable benefit is often the reduction in Vehicle Operating Cost (VOC). At low traffic levels (less than 50 vpd) these are usually not significant and it is socio-economic benefits which need to be assessed. There are therefore a number of parameters to be quantified which may be suitably 'weighted' according to locally perceived priorities and from which a priority rating may be obtained. These parameters are:

- population served by the road
- numbers of resettled returnees
- agricultural area served
- agricultural potential (additional area)
- crop productivity

- public amenities (clinic: school)
- existing traffic levels
- current accessibility rating
- road length and estimated rehabilitation cost

Using the emergent priority list the Development Committee would need to exercise an overall responsibility to ensure that a logical network development plan was evolved which best reflected these priorities.

The secondary network should be considered at provincial level based on representations from the DDC whose priority tertiary proposals may be rendered irrelevant without improved secondary links. Secondary roads traverse District boundaries and even, in some cases, provincial boundaries also. Although similar parameters may be used for secondary roads planning traffic levels and costs are more major considerations and a simple economic analysis is more feasible.

In fact, for example, in Banteay Meanchey only 35 km of secondary roads are not yet included in an aid programme and thus a planning exercise is hardly relevant. In Battambang the total length of secondary roads is 229 km of which one road alone (No 160) is 130 km long. The remainder are all less than 25 km each.

2.13 Local Capacity

The provincial PWD and DRD are already involved in the existing road network planning process and they have clearly defined priorities of road rehabilitation. Although these may not have been the subject of the more rigorous 'bottom-up' process now proposed; they are based on local knowledge: traffic levels: agricultural needs (e.g. rice production) and settlement of returnees. Technical staff who have worked with the ILO project CMB/92/008 certainly have the capacity to make engineering assessments and cost estimates for individual sub-projects and they have, in fact, recently completed the flood damage assessment.

The technical assistance required will be to introduce the more formalised planning process and priority ranking system detailed above and to establish the data collection where it is lacking (eg 7 day traffic counts). Much of the statistical socio-economic data already exists within the CARERE administration. Experience shows that once trained in the basic techniques local capacity will be more than adequate to complete the process. The Project Adviser will be able to cover this area with assistance from a local consultant (Transport Economist) for short training inputs as appropriate.

2.14 Objectives: Strategy and Institutional Framework

This single project has two components,

- Local Rural Road Fund (LRRF)
- Capacity Building

Capital Funds are to be provided by UNCDF and Technical Assistance funding by UNDP. The capital funds are specifically targeted at 150 km of rural road rehabilitation (secondary and tertiary) and 500 km of road maintenance established, using labour-based technology through the private sector. The two components are mutually dependent since no capacity exists within local government to plan, design and manage labour-based contracts, nor are there any contractors; and capacity cannot be built up without practical activities on which to build the necessary experience.

Government has established the PRDC to be responsible for the decentralised planning and implementation structures already being set up, and UNDP, through CARERE, is giving this strategy active support in 5 provinces. The LRRF is a practical expression of this support under the CARERE 2 framework which will test the institutional arrangements. It will operate in the traditional contractual manner of Client (or Employer), the PRDC: Engineer (the appropriate

technical department) and Contractor (the trained labour-based small-scale contractor). Because the whole project is within the technological field where it has the most accumulated experience ILO will be requested to provide the technical assistance for the implementation of works and the capacity building (simultaneous activities). As CAREERE 2 is implemented by UNOPS ILO will act in the manner of a sub-contractor through an Inter-Agency Agreement.

Funding for LRRF will be channelled directly to the PRDC as Client with the PWD (secondary roads) and PDRD (tertiary roads) acting as Engineer (project manager). The Directors of the Departments remain responsible to their line Ministries who must therefore approve the working arrangements, and technical aspects of the works.

PRDC will be generally assisted and supported in their Client role by the CAREERE 2 team for planning; administrative and financial systems and procedures, and by the technical assistance team (ILO) for any technical aspects e.g. civil works contractual responsibilities.

Central government meanwhile will be supported in the development of LBAT on a wider scale by the established Task Force and the Upstream Project (UNDP/ILO) which has specific inputs to the project.

- Road standards; width, construction
- Standard specifications
- Contract Documents for small-scale LBAT contracting
- Training materials for all levels of personnel
- Technical site manuals
- Specialist advice and training inputs

In the light of the number of parties involved in the components of the project implementation a Monitoring Group in each province is recommended to meet regularly (e.g. every 2 months) to review the activities.

- PRDC Representative
- Technical Department Directors
- CAREERE Area Development Manager (ADM)
- ILO Project Adviser
- UNDP Representative
- LBAT Task Force Representative

The outputs, activities and responsibilities have been set out in Part II.

It is strongly recommended that the Client (PRDC) has control of the funds on an imprest account basis since payment is one of the prime contractual functions of the Client and there are legal implications for default. No Client can sign a contract without having control of the means of payment. The CAREERE 2 ADM would hold a co-signatory position in order to monitor disbursement and he would ensure that the imprest account is replenished at the request of the Client following interim payments to Contractors. It is important that funding is channelled as directly as possible to avoid the delays which inevitably occur when several parties are involved. It is assumed that external UN Agency Funds are channelled through UNDP.

The LRRF is envisaged as an experiment in decentralised funding and as such it should clearly assist the smooth running of the implementation programme through the medium of local disbursement which is not the current situation for contractors. The objective is that this could become the pattern for other agencies to follow both in further supporting the CAREERE programme and in extending it to other provinces.

2.15 Project Approval

The PRDC has a wider responsibility than the CAREERE target zones within the province and it

will be considering sub-project appraisal on a province-wide basis. The initial criteria for road sub-project selection will need to include,

- security situation
- demining programme
- national policy (eg priority for returnees)
- major developments (eg irrigation and/or agricultural)
- programmes of other agencies (NGO:IO:Bilateral)
- provincial priority areas
- geographical convenience (it would not be sensible to select a series of short tertiary roads widely scattered throughout the Province)
- District priority proposals

CAREERE's role will be to assist with these components while technical feasibility of the projects would be assessed by the technical departments (advised by the TA team). Once a priority programme has been agreed by the PRDC the Technical Directors would be requested to implement it in the role of Engineer (which is their normal responsibility anyway) through LBAT contract procedures.

2.16 Local Capacity

If many of the 300 technical personnel (6 Provinces) trained within the CMB/92/008 project returned to the ministry departments in their respective provinces there would be no concern about the local capacity since such people would naturally expand their experience into the contract management field. The danger is that, given the uncertainty of the ILO transition phase, many of the staff will quickly disappear to other agencies and projects since they will be in great demand. Capacity at the time of project commencement will have to be re-assessed.

For the start of implementation it is recommended to retain the Battambang ILO base within the PWD compound while focusing the capacity building equally on both PWD and PDRD. The demonstration road training site could be one of the shorter secondary roads within easy reach of the town. Tertiary roads are somewhat more remote which can cause logistic problems for the large number of trainees.

III Financial & Socio-Economic Analysis

3.1 Project Costs

Taking account of real costs including an equipment repayment period for 64,000 USD of 2 years the estimated cost of tertiary road construction assuming,

- 0.7 metre embankment
- 5.0 metre gravelled width
- 200 mm compacted laterite surface
- 2 culverts per km
- 1 bridge per 4 km
- Productivity 1.5 km per month
- 10% profit margin

is USD 15,073 per km (see Annex 6). Stretching the repayment period over 3 years would reduce this figure by about 1,000 USD.

Secondary roads with traffic levels of less than 100 vpd would have similar construction but be 1.0 metre wider thus costing an estimated 18,000 USD per km for 2 year repayment period.

Routine maintenance lengthman contracts are for 1 km based on 10 working days per month at a rate of 2 USD per day. Allowing for tools and a profit margin the budget estimate is 300 USD per km per year.

For the periodic maintenance operation of regravelling, using the same basis, the estimated contract cost is 8,000 USD per km.

Part of the UNCDF funding will be allocated to the initial procurement of tools and equipment required by the contractors to carry out the works. The capital cost, as new, of a set, judged to be the minimum in terms balancing financial commitment against the maximum productivity potential, and bearing in mind the very high TA investment cost, is around 64,000 USD. However, some potential contractors already own some items of plant; others may prefer to take good condition used equipment from the current project and others may prefer to limit their financial liabilities and balance it with hiring. For budget purposes, an allocation of 50,000 for each of the suggested 8 contractors has been made ie 400,000 USD. Under the contractors equipment loan agreements, the capital plus interest will be repaid and thus a fund will accrue to government over the project period. It should be conditional that these funds are used to extend project implementation (eg 400,000 USD represents a further 25 km of rehabilitated road or 50 km of gravelling). It could also be used as capital to start new contractors in the programme. The interest payments made will be sufficient to pay the fees and costs of the financial institution (ACLEDA or other) engaged to manage the loans on the government's behalf.

Construction work is season-dependent and two months are allowed each year for downtime, coinciding with the actual monsoon period. Thus annual expenditure will vary, especially in terms of the actual start date which has been set at July 1996 in order to allow a full construction season from October/November 1996. If this date slips then the monsoon of 1997 could disrupt the programme as set out in the tentative work plan. On the basis of that Plan, annual expenditure is summarised in the following table:

Expenditure	1996 (6 months)	1997	1998	1999 (6 months)	TOTALS
Rehabilitation (Training)	50,000	350,000			400,000
Rehabilitation (Contracts)		180,000	1,575,000	(810,000)*	1,755,000
Regravelling (Contract)			385,000	(576,000)*	385,000
Maintenance (Contract)	30,000	120,000	150,000	75,000	375,000
Tools/Equipment (Procurement)		400,000			400,000
Missions		15,000	20,000	50,000	85,000
Contingencies		40,000	40,000	20,000	100,000
Totals	80,000	1,105,000	1,169,000	145,000	3,500,000

(1,386,000)*

*Additional Funding Needed

NOTE: Cambodia operates a dollar economy and payments to contractors can be made in dollars so no allowance for local currency component or exchange rate considerations has been made.

The UNDP funded technical assistance has been costed in detail to show both the main advisory input and also the essential supporting staff and organisation required for the TA to fulfil its role. At this stage, it is judged that Government will not be able to cover any of these supporting costs, since they are extra to their current staffing for which resources are presently only barely available.

This level of support is critical if the government managers and advisers are to be able to operate effectively since so much of the activity is field-based ranging widely over two provinces. The support organisation is very closely based on previous experience.

3.2 Financial Analysis

In view of the size of the investment proposed for this project both in terms of capital funds and TA contribution it is important to assess the long-term sustainability and the possibilities of extending the methodology on a wider basis. A project which successfully trained 8 contractors and completed 150 km of road rehabilitation could not be justified as an end in itself. The key considerations are:

- Government commitment to LBAT
- Government commitment to develop the private sector
- Government capacity to sustain the maintenance of rehabilitated infrastructure
- Willingness of other donor agencies to invest in similar technology and methodology
- Capacity of local government to establish effective decentralised planning structures ensuring local involvement in development and maintenance of infrastructure

On government commitment, the establishment of the LBAT Task Force and the stated and agreed policy to develop the private sector are clear. Assistance will be needed in the practical implementation of this. Infrastructure maintenance has always been a problem and adequate resources are seldom available. Continuing external assistance will be necessary for the foreseeable future but currently there is a greater awareness amongst donors, NGO and government of the crucial importance of maintenance. This has been highlighted by the recent flooding which has caused so much damage and disruption. Routine maintenance of rural road using LBAT will not vary greatly from USD 300 per km per year and this is a modest figure in terms of some of the major aid packages proposed.

There are several other donors with experience elsewhere of the effectiveness of LBAT and continuing dialogue at project formulation stage should enable sustainable and expanding use of the technology to be assured.

The CARERE 2 objectives in terms of decentralised planning structures are a key element to local rural development giving a sense of ownership (and hence maintenance responsibility) to local communities. At this level agencies like WFP could play a vital role in taking road maintenance into its food-for-work activities if other resources were limited.

The government capacity, in terms of trained staff, to continue the development of LBAT rehabilitation and maintenance by the end of the project can be reasonably assured, however whether the staff will choose to remain in government employment given the poor salaries and other benefits cannot be certain. Also, the current moves to reduce drastically the Civil Service could have an adverse effect if key technical staff are not exempt.

It also has to be assumed that government policy will remain unchanged in regard to rural development following any political changes which may result after the next elections.

3.3 Economic Analysis

Traditional economic analysis (IRR and Cost/Benefit) is not appropriate to rural roads projects which are much more concerned with quality of life; basic accessibility and socio-economic benefits which are mainly unquantifiable. Even agricultural surplus theory is not relevant at this point in the development cycle since the main priority areas are those for the settlement of refugees and IDP. Their priority will be food for survival rather than surplus. The major economic advantages come through the use of LBAT which will generate employment opportunities and boost local economies through the wages paid to the workers. Even over the period of a few

months this makes a significant impact to quality of the life by enabling some small capital investments (seed: fertiliser: sewing machines: bicycles: buildings) to be made by individual choice. Experience from other projects indicates that these choices are very specific and carefully thought about. The general development benefits that good rural access can bring are many and various and very much community-dependent. Under the CARERE 2 framework, local communities will be best placed to take full advantage of this improved accessibility.

IV Environmental Aspects

No new roads are envisaged under the project and thus there are no damaging environmental activities foreseen. Current road rehabilitation operations are seen as locally beneficial in terms of the scale of soil excavation activities. To form the embankments soil is excavated locally, at regular intervals, in the form of shallow borrow pits. After construction, these naturally fill with water and quickly become local fishponds. The siting of these pits is agreed with local communities beforehand in order to gain the best future advantage for them. Laterite excavation is limited to the number of isolated hillocks and some environmental damage initially results. Borrow pits can be well shaped and landscaped after excavation operations but many are widely and continuously used and any rehabilitation works would be done at a very much later date. Eventually natural vegetation will be very quick to reclaim the areas once they have been worked out.

A major consideration in roads development needs to be the requirements of irrigation, and associated eco-systems, since it is of prime importance to retain water rather than, as road engineers may prefer, to allow free drainage regimes.

V Risks

The following risks have been identified:-

- (i) Current ILO project resources (equipment/staff etc) not available to commence the project in June/July 1996
 - full availability would give the project a 'head start' while non-availability would delay it several months. Much will depend on the transition phase proposals for the ILO project.
- (ii) Contractors not available/willing to join the project
 - seen as a negligible risk.
- (iii) Local staff not available in provincial technical departments for 'Capacity Building' involvement
 - not seen as a major problem although the calibre will be variable.
- (iv) Provincial Departments not allocated funding for future routine/periodic maintenance activities
 - always a serious potential risk.
- (v) Financial systems/support not able to pay contractors in a regular/timely manner
 - an essential for project success and a major risk.
- (vi) No continuity of work for contractors beyond the project period
 - not considered a serious risk given known donor interest.
- (vii) Technical assistance team not given sufficient autonomy to deliver the project outputs together with the project management
 - not a serious risk if all roles and responsibilities are clearly defined.
- (viii) Contractors default with equipment and disappear
 - an ever present risk but experience shows it has not yet happened.

- (ix) Security situation forces disruption/closure
 - no control over this potential event
- (x) Counter attraction of alternative employment for workers/contractors
 - this could be serious with so many other organisations/agencies working in the same field. Good coordination will be required.
- (xi) Upstream project outputs (eg training materials) not available in due time
 - highlights the importance of strong linkages.
- (xii) Demining of roads required for roads identified for construction
 - experience suggests full cooperation can be expected so that delays would be minimal.
- (xii) Incentives for involvement of Government staff lacking
 - this is a real risk to be overcome.

None of these risks are judged sufficient for a negative recommendation to be made about the project.

VI Other Issues

The question arises as to how large a small-scale labour-based contracting enterprise should be and there are a number of considerations to be taken into account.

- the experience of contractor development programmes over the last 10 years.
- the incentive for contractors to join the programme and to continue with it.
- the amount of capital investment and therefore financial liability for the contractors.
- productivity that can be compared for economic viability with alternative technologies.
- the initially high level of investment in Technical Assistance at the start of these programmes.
- the importance of good quality construction which compares with alternative technologies.

Most projects of this type have used 2 km per month of rehabilitated gravel road as the target productivity on the basis that, for the much smaller capital (equipment) investment, 25 km per year compares favourably with the more capital intensive (4 to 6 times) equipment-based technology.

This target has proved to be achievable with labour forces of around 220 workers and equipment investment of upwards of USD 150,000. Equipment repayment periods of 4 years were set in this case. However, the financial liability and guarantee of work continuity were crucial factors.

In Cambodia, 1.5 km per month have been achieved under the current 'force account' arrangements and with laterite supply being a sub-contracted activity no haulage equipment is required by the small-scale contractors. Basic sets of equipment can, therefore, be reduced to around 64,000 USD capital investment. This includes only rollers as a double item and since,

- two separate and distinct operations require compaction
- compaction is essential for good construction quality
- an inoperative roller brings virtually everything to a halt
- rollers used continuously are liable to mechanical failure from time to time.

Two rollers are deemed essential for viable operations. A truck (with essential water bowser): a pickup for the contractors mobility to and from centre to site: tools and supervision motor cycle and bicycles represent the minimum addition requirements for a contractor to be able to operate independently and freely, which is essential for his future involvement in this or other projects.

Other options are to develop labour-only contractors (as is proposed for routine maintenance) where any necessary equipment is supplied and operated by the Client. This has no development potential since contractors have gained nothing material at the end of the project and have no further opportunity of independent operation. If this was the objective then rehabilitation activities could remain very much as they are at present with only the engagement, management and payment of labour being transferred to a 'contractor'.

Technical assistance investment is initially very high and it is imperative that this shows the best possible return which is to develop the greatest potential possible in the small-scale enterprises. Such investment would not be justified for anything less than is proposed.

The terms of the equipment loan agreements, recommended to be between two and three years, will be such that the equipment will be repossessed in the event of irreconcilable default so that the financial risk will be minimised.

UNCDF INPUTS

The UNCDF inputs are the Capital Costs of the equipment to be supplied to the contractors and the costs of the physical rehabilitation and maintenance works:

Also to be included are the costs for project review and evaluation missions during the project period.

The following is an estimation of the annual budget requirements assuming a project Start in July 96.

US Dollars						
Code	Details	Totals	1996	1997	1998	1999 6 months
16	Monitoring & Evaluation Missions	85,000	-	15,000	20,000	50,000
20	Rehabilitation (Training)	400,000	50,000	350,000	-	-
	Rehabilitation (Contracts)	1,755,000	-	180,000	1,575,000	(810,000)*
	Regravelling (Contracts)	385,000	-	-	385,000	(576,000)*
	Maintenance (Contracts)	375,000	30,000	120,000	150,000	75,000
21	Non-Expendable Equipment	400,000	-	400,000	-	-
	Contingency Costs	100,000	-	40,000	40,000	20,000
TOTALS		3,500,000	80,000	1,105,000	2,169,000	145,000

(1,386,000)*

*Additional Funding Needed for Continuing Programme

UNDP INPUTS

UNDP resources will be provided to cover the cost of the training and the technical advisory support as described in this report, and will include the following items:

Fixed-term Staff

Project Adviser - 36 work months

The PA will provide assistance to the overall management and coordination of all project inputs and activities, as well as assisting in the provision of project outputs and in particular those related to the establishment of an effective implementation capacity within the technical Departments.

Maintenance Engineer - 36 work months

The ME will be responsible for technical assistance to all road maintenance activities. He/she will also be utilised for the implementation of training courses, in particular in road maintenance related topics.

Training Engineer - 24 work months

The TE will be responsible for the overall planning and implementation of all training activities,

including both class-room and field training, for the contractors and government personnel.

National Professional Training Engineer - 24 work months

The NPRE will assist the Training Engineer in the management and implementation of all project training activities.

National Professional Road Engineers - 2 x 36 work months

Two NPREs will provide technical advisory support to the government and contractors' technical staff related to the planning, implementation and supervision of the road rehabilitation and maintenance works. One NPRE will be stationed in each of the two Provinces covered by the project.

National Professional Finance Advisers - 2 x 36 work months

The project will recruit two National Professional Finance Advisers to assist the government departments in establishing financial and administrative procedures which will enhance their capacity to manage and monitor the road works.

Complete job descriptions for this staff are included in Annex 5.

Administrative Support Personnel

1 Secretary	36 wm
1 Messenger	36 wm
1 Administrative Assistant	36 wm
1 Translator	36 wm
5 Drivers	<u>180 wm</u>
Total	324 wm

Short-term International Experts

Short-term consultants will be recruited to provide specialist inputs to supplement the training team in training needs assessments, course programme development and implementation. Topics may include road works technology, rural transport, labour issues, contract management, etc. The exact nature of these inputs will be determined when the project prepares the detailed training programme in collaboration with the upstream project.

Review Mission

The Project will recruit three consultants, one labour-based road works expert, a contracts management adviser and a road engineer for a one-month project review and appraisal at the end of Year 2 of the project.

Provisions have also been made for project monitoring mission from ILO headquarters (Bangkok and Geneva).

Local Consultants

Local consultants will be engaged to assist in the training programme, to provide training in Operation and Maintenance of Equipment and in Business Management. In addition, local consultants will be utilised for translation of specific technical topics when conducting training courses.

Fellowships

Provision has been made for key Government counterpart staff to participate in the International Courses in Labour-based Road Works Technology in Kisii, Kenya.

Study Tours have been included for local project and counterpart staff to visit other labour-based road contractor development projects in Southern Africa.

In-service Training

The project will arrange training courses, work-shops and seminars for various categories of government and contractors' staff. Provision has been made for covering travel, catering and boarding for government staff trainees and lecturers during these training activities. Cost sharing with other donors will be explored in relation to training inputs when requested by a specific project.

Equipment

Light construction equipment and hand tools for the demonstration site and the contractors will be provided by the on-going project CMB/92/008 and replenished with new equipment financed by UNCDF. UNDP funding will be mainly restricted to operation and maintenance costs.

Inspection Equipment

Transport for the technical assistance team and its counterparts should be transferred from current ILO/CARERE operations. It is estimated that a minimum of six four wheel drive vehicles are required on a permanent basis in order to carry out envisaged project activities in the two provinces. In addition, the motorcycles currently possessed by project CMB/92/008 should be made available to the project and counterpart staff for works inspection purposes.

Office Equipment and Operation

The following equipment will be acquired for the project staff to carry out efficiently the technical assistance services:

- 2 desk-top personal computers with printers
- 2 photocopiers
- 4 sets of office tables, chairs and book shelves
- 1 overhead projector
- 1 video camera
- 1 video player and monitor

In addition, it is expected that the current office and communication equipment of project CMB/92/008 will be maintained in good running order and will eventually be transferred to this project.

Provision is also made for communications and other miscellaneous costs and petty cash requirements and takes into account the limited financial capacity of the government to provide full services in this respect.

Staff Travels

The project activities will require extensive travelling for the project staff to the training sites and to the contractors working locations. Sufficient provision is made to cover such in-country travel. In addition, provision is also made for field allowances for counterpart personnel according to current UNDP procedures.

ILO INPUTS

The Development Policies Branch (POL/DEV) of ILO has an ongoing programme on the development of rural and urban infrastructure programmes relying on the cost-effective utilisation of locally available human and material resources. The ILO will contribute to the project from the resources available to this programme. These contributions will be in the form of technical backstopping and specialised training and technical materials in the fields of labour-based construction and maintenance; and entrepreneurship and management development.

PROJECT BUDGET COVERING CONTRIBUTION FROM UNDP

Country: Cambodia		Title: Labour-based Roads Rehabilitation and Contractors Development Project									
Code	Details	W/M	Total \$	W/M	1996 \$	W/M	1997 \$	W/M	1998 \$	W/M	1998 \$
10	PROJECT PERSONNEL										
11	Experts										
11.01	Project Manager	36	420,000	6	70,000	12	140,000	12	140,000	6	70,000
11.02	Maintenance Engineer	36	360,000	6	60,000	12	120,000	12	120,000	6	60,000
11.03	Training Engineer	24	240,000	6	60,000	12	120,000	6	60,000		
11.51	Short-term Consultants	9	180,000	2	40,000	2	40,000	2	40,000	3	60,000
11.99	Sub-total	105	1,200,000	20	230,000	38	420,000	32	360,000	15	190,000
13.11	Admin. Support Personnel										
	Admin. Assistant	36	36,000	6	6,000	12	12,000	12	12,000	6	6,000
	Translator	36	36,000	6	6,000	12	12,000	12	12,000	6	6,000
	Office Staff	72	36,000	12	6,000	24	12,000	24	12,000	12	6,000
	5 x Drivers	180	54,000	30	9,000	60	18,000	60	18,000	30	9,000
13.22	Field Allowances		90,000		15,000		30,000		30,000		15,000
15	Duty Travel		96,000		18,000		36,000		30,000		12,000
16	Mission Costs		35,000		5,000		10,000		10,000		10,000
17	National Prof. Staff										
17.01	2 x Road Engineers	72	72,000	12	12,000	24	24,000	24	24,000	12	12,000
17.02	Training Engineer	24	24,000	6	6,000	12	12,000	6	6,000		0
17.03	2 x Finance Adviser	72	72,000	12	12,000	24	24,000	24	24,000	12	12,000
17.04	Local Consultants	15	15,000	3	3,000	6	6,000	6	6,000		0
19	Component Total	507	566,000	87	98,000	174	196,000	168	184,000	78	88,000
31	Fellowships		35,000				20,000		15,000		
32	Study Tours		42,000		7,000		14,000		14,000		7,000
33	In-service Training		90,000		15,000		30,000		30,000		15,000
39	Component Total		167,000		22,000		64,000		59,000		22,000
45.01	Local Procurement		30,000		15,000		10,000		5,000		
45.02	Equipment Maintenance and Operation		60,000		10,000		20,000		20,000		10,000
49	Component Total		90,000		25,000		30,000		25,000		10,000
50	Miscellaneous										
52	Reporting Costs		15,000		2,500		5,000		5,000		2,500
53	Sundries		75,000		12,500		25,000		25,000		12,500
59	Component Total		90,000		15,000		30,000		30,000		15,000
	SUB-TOTAL		2,113,000		390,000		740,000		658,000		325,000
	Cost Increases		115,560				37,000		46,060		32,500
68	Programme Support		274,690		50,700		96,200		85,540		42,250
	TOTAL PROJECT COSTS		2,503,250		440,700		873,200		789,600		399,750

A tentative Planops has been prepared on the basis of a project commencement in July '96. The bar-chart shows also:

- pre-project activities over the previous six months. These have been detailed in the Project Document and will have a significant bearing on the effectiveness of the first few months of the project.
- the ILO project Transition Period which will also have a considerable influence on the start of the project. This period is seen as one of smooth, phased, transition of activities in Battambang and Banteay Meanchey into the new project. At the same time work in the provinces of Siem Reap and Pursat needs to continue at current levels until funding becomes available for their incorporation into the contractor development. It is proposed that 0.5 million USD per province per year is made available in these two provinces within the CARERE budget for infrastructure development and this should secure the continuity.
- the project progress tied in with the monsoon period such that it should be possible to complete the demonstration and first trial contract phases before the start of 1997 monsoon. However any slippage at the start would disrupt that and shift the subsequent completion of activities well towards the end of 1998, (ie 6 months before the end of the project).
- continuity for the contractors once they have finished their full trial contracts. Additional funding will be necessary for this - available towards the end of 1998.
- maintenance activities expanding to Siem Reap and Pursat on the basis of the funding as earmarked above.

1 General

The training programme described in this section defines a general model for the training which it is expected will be used for (i) all CARERE supported road and irrigation works and (ii) for other projects envisaged in the near future.

Training is a major activity in both the "upstream" and "downstream" ILO technical assistance projects and will require close coordination in order to be delivered in an effective manner. Although the lead responsibility for the contractor training programme will be with CMB/96/C01, this project will rely on specific outputs of the "upstream" project. The "upstream" project will provide support to CMB/96/C01 training activities through the provision of a complete training package consisting of course programmes and training materials. Furthermore, the upstream project will provide technical support to training activities of this project in order to (i) ensure correct and effective use of the training material and (ii) to monitor results of training programme development efforts and provide vital information enabling the "upstream" project to modify systems and procedures and finalise the training packages. This linkage will ensure that the "upstream" support is catering for the real and full needs as identified at downstream level.

The training of the contractors will be provided through the project with financial assistance from UNDP. The contractor should receive the training of his/her staff free of charge, providing only staff salaries and accommodation of their staff during the training period. The contractors should be obliged to pay an enrolment fee (approximately US\$ 100), to serve as a guarantee for their full commitment (and attendance) to the training programme.

2 Training Needs

The first training related activity will be to carry out a survey of contractors available in the country and preferably operating in the project area. During interviews with the contractors, their exact size and experience as well as formal training background of their staff can be identified. The detailed content and extent of a training programme should therefore only be finalised once the final screening and selection of the contracting firms have been carried out. However, at this stage it is possible to identify the main topics which need to be included in a training programme (see Tables 1 and 2).

3 Training Programme

The training will concentrate on skills development specially required for the planning, execution and supervision of the envisaged road rehabilitation and maintenance works carried out by the small-scale contractors. Training will include both government staff and personnel from the contracting firms ranging from general management to plant operators, mechanics, store keepers and site supervisory staff.

The objectives of the training programme are to:

- ☛ Establish a cadre of domestic small-scale contractors capable of undertaking road rehabilitation and maintenance works using labour-based methods. This implies that the firms are fully conversant with the technology, contract management, business administration and supervision of labour, machines and materials;

- ☞ Create a capacity within the local government to plan, manage and supervise road works carried out by private contractors using labour-based methods;
- ☞ Establish a local capacity for training government and private sector staff in the use of labour-based rural infrastructure rehabilitation and maintenance technology.

4 Strategy

In order to achieve the above objectives training will be provided to:

- (a) provincial government department staff including Engineers, Planners, Technicians, Supervisors and contracts administration staff,
- (b) contractors' staff from managers, supervisors, clerks, mechanics to plant operators, and
- (c) representatives of the local communities, policy makers, planners and administrators.

The training for the various categories of staff needs to be carried out with varying durations and through different approaches such as on-site and classroom training, workshops, seminars and study tours.

5 Methodology

On-the-Job Training

It has been proved over the years in a number of countries that on-the-job training is the most effective tool for training most categories of government and private sector staff. This approach will also be used during this training programme and the training of technical staff will therefore be carried out through demonstration and practice at training sites. This approach can be used for managers, engineers, inspectors, supervisors, foremen and machine operators with the on-site training being supported by classroom components tailored for the various categories of staff.

A training/demonstration site will be fully equipped with the same type of hand tools and light equipment with which the contractors will be provided once they have successfully completed the training course. Two sets of equipment for this purpose should be made available from the existing labour-based units, to provide two training construction units for the intended 8 contractors.

Short Courses

Intensive refresher courses for periods of one to two weeks will be organised to supplement on-the-job training for some of the technical staff. It will also include independent courses for other staff categories such as storekeepers, accountants, pay clerks and administrative officers.

Seminars

Seminars will be organised as a means of disseminating data and information, in particular to senior government officials at central and provincial level, as well as representatives for other government agencies, donors and the private sector. Thus, seminars will be a useful platform for policy makers, planners and administrators to review the implications of using labour-based methods and to enhance the domestic private sector participation in road rehabilitation and maintenance works. Project results may also have implications for other parts of the road network as well as other sectors.

Study Tours

Visits to similar but more advanced programmes in other countries can be very stimulating and inspiring for managers, engineers and trainers. It is therefore proposed to organise study trips to the ongoing feeder roads construction and maintenance programmes in Africa where domestic

contractors have been trained in the use of labour-based methods (e.g. Lesotho and Tanzania).

International Courses

To strengthen the capacity as well as to motivate the Provincial Engineers and Technicians, it is recommended that selected staff are sent for further training in the management of labour-based road construction and maintenance at the Kisii Training School in Kenya. These courses, organised and supported by ILO, and the Swiss Development Corporation in collaboration with the Ministry of Public Works in Kenya, are aimed at improving the efficiency of the management of labour-based road projects introducing the participants to latest information and techniques for the effective use of labour and other local resources drawing upon the experience from ongoing projects worldwide.

6 Curricula

The training package will consist of the following three major elements:

- labour-based road construction and maintenance technology,
- business and contract management, and
- operation and maintenance of mechanical equipment.

The training courses will be based on existing literature already developed by the programme but adjusted to the specific needs related to the private sector involvement. In addition, the training programme will benefit from training materials developed under similar contractor development programmes in other countries (e.g. Lesotho, Tanzania, Ghana and Uganda). The Technical Enquiry Service of ILO/ASIST in Nairobi, Kenya will be able to provide literature developed by these programmes. The development of the training programme and materials will be carried out by the "upstream" project.

(i) Labour-based Road Technology

This topic will constitute the major part of the training programme. Although the contractors may recruit some of their site supervisory staff from government, their managers, technicians and possibly some additional supervisors, who may be required, will through this training receive their first introduction to labour-based road technology. The curricula for contractors who will be engaged in labour-based road rehabilitation works should cover the subjects as outlined in the Table 1.

(ii) Business and Contracts Management

One of the objectives of this programme is to develop further the contractors to enable them to manage contracts, which may be of a larger size than the works they have previously carried out. In order to achieve this objective, the contractors will not only require training in road technology, but also in general management issues related to the daily running of a construction company.

It is therefore proposed that the contracting firms are offered short-courses in essential aspects of management such as pricing and bidding, site operations, book-keeping, accounting, marketing, office work and planning. This training component should be offered to the various cadres of staff as outlined in Table 2.

Subject	Contents	Trainees
Planning	how a labour-based project is planned at different levels, discusses the planning responsibilities of the various levels of staff, work plans, organising site camps, planning of tools and equipment, and the hiring and organisation of casual labour	Contractor Managers, Technicians and Supervisors, Provincial Engineers and Site Inspectors
Reporting and Control	administrative control of a work site, production control and quality control	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Site Inspectors
Work Organisation	sequence of labour-based work activities, gang balancing, instruction and motivation of labourers	Contractor Engineers, Technicians and Supervisors and Site Inspectors
Tools and Equipment	selecting appropriate tools and equipment, how it is handled, its use and maintenance and the role of the store-keeper	Contractor Engineers, Technicians and Supervisors, Plant Operators, Storekeepers Provincial Engineers and Inspectors
Survey and Setting Out	setting out horizontal and vertical alignments, cross sections, curves and how to use various setting out equipment such as profile boards, templates, string line levels etc.	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors
Clearing	clearing the alignment of vegetation and boulders	Contractor Engineers, Technicians and Supervisors Provincial Engineers and Inspectors
Drainage	the vital importance of a well functioning drainage, how to construct side and mitre drains, camber, catchwater drains, scour checks, and culverts	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors
Earthworks	how to measure and estimate earth works done by labour, the organisation of excavation, levelling, hauling, loading, unloading, filling and spreading, compaction and erosion control	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors
Compaction	presents simple soil mechanics, optimum moisture content, indirect compaction, direct compaction and the use of hand rammers, deadweight and vibrating compaction	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors
Gravelling	how to organise gravelling operations, and testing of gravel quality	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors
Maintenance	the organisation and implementation of the various activities on labour-based routine, periodic and emergency road maintenance, and the required tools and equipment	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors
Structures	construction and maintenance of small bridges, drifts, causeways, culverts and box culverts	Contractor Engineers, Technicians and Supervisors, Provincial Engineers and Inspectors

Table 1 Labour-based Road Technology

Subject	Contents	Trainees
Business Management	bookkeeping, profits, budgeting, cost control, cash flow planning, material purchase, personnel management, banking, taxes, labour regulations	Contractor Managers and clerks
Contract Management	bidding and submission, unit rates, estimating, tender preparation, contract documents, contract variations, claims, payments	Contractor Managers, Technicians and clerks
Contract Supervision	contract conditions, submission and tendering, contract variations, claims, payments, work inspection, contract administration	Provincial Engineers and Inspectors

Table 2 Business and Contracts Management

(iii) Operation and Maintenance of Equipment

Through loan arrangements the contractors will be supplied with light construction equipment and tools to a total value of up to US\$ 64,000:-. In order to ensure that the equipment is well maintained, the programme should provide the mechanics and operators with proper training in preventive maintenance and correct use of the equipment, and the managers with instruction in efficient equipment utilisation and economics.

7 Training Site

The training will be executed through a combination of class-room and on-site training. For this purpose, the project will establish a training centre and a demonstration site in close proximity. The training centre will require easy access to catering and accommodation facilities for trainees, lecturers, instructors as well as for visitors. The centre together with the demonstration site will also be an essential asset for promoting the programme and its technology and approach amongst donors as well as other government institutions.

The centre will need classrooms with sufficient capacity for 50 trainees, and will be fully equipped with training aids such as overhead projectors, slide projectors, video equipment, training manuals, flip charts, black boards, etc. For the development and production of training materials the centre will need a personal computer with good printing facilities, a photocopier and a stenciller.

The demonstration site will be fully equipped with the same type of hand tools and light equipment with which the contractors will be provided once they have successfully completed the training course. Two sets of equipment in good condition should be made available for this purpose through Project CMB/92/008.

8 Instructors

In order to achieve a sustainable programme, it is crucial that the training capacity for this type of programme is fully institutionalised in the country. To achieve this objective, there is a demand for a structured plan for the involvement of local trainers.

From the onset of training, a number of government engineers, technicians and supervisors must be permanently attached to the training site. They should be trained to take over gradually responsibility for the training from the project training specialists, and cater for a future expansion of the labour-based road technology to other Provinces (Siem Reap and Pursat in the immediate future). This will ensure that, once the training material and the first training course has been conducted, it should be possible for government staff, with the assistance of project

resources, to take the lead in conducting further courses.

The demonstration site will require instructors fully conversant with all aspects of site activities, and it is therefore proposed that supervisory staff from the ongoing labour-based programme are recruited for the training.

The business management training should be carried out together with a local capacity within this field (i.e. local consultant, bank, university, ACLEDA, etc). Possible collaborators in this field should as soon as possible be identified so that a programme can be prepared before training commences.

9 Training Material

For the training and development of petty and small-scale contractors, there already exists a certain amount of training material produced by ongoing contractor development programmes in Africa. This training material consists of (i) general literature on labour-based road construction and maintenance technology developed by the ILO, and (ii) project specific material developed for contractor development and management.

In addition, the ILO has produced a series of publications on contractor development and management for the construction industry in general under its Improve Your Construction Business Programme (IYCB). This material is relevant, however, it was originally developed for the building construction industry and therefore needs to be modified before it can be used in a training programme for labour-based road sector programmes.

ILO	<ul style="list-style-type: none"> • Guide to the Training of Supervisors • International Course for Engineers and Managers of Labour-based Road Construction and Maintenance Programmes
Cambodia	<ul style="list-style-type: none"> • Introductory Training Course for Labour-based Road Construction for Engineers and Technicians • Introductory Training Course in Labour-based Works Management for Engineers and Technicians • Introductory Training Course in Labour-based Works Project Planning for Labour-based Contractors • Rural Feeder Road Maintenance Using Labour-based Technology, Short Training Course • Preventive Maintenance for Labour-based Vehicles and Equipment and Safety Guidelines for Operators and Drivers • Training Videos for Labour-based Road Construction and Maintenance Supervisors (Khmer version)
Lesotho	<ul style="list-style-type: none"> • LCU training material
Botswana	<ul style="list-style-type: none"> • Training Course Notes for Gangleaders • Training Course Notes for Technical Assistants
Uganda	<ul style="list-style-type: none"> • Labour-based Contract Maintenance Programme, Orientation Course for District Engineers
Kenya	<ul style="list-style-type: none"> • Course notes for inspectors and overseers • Maintenance Management Manual
IYCB	<ul style="list-style-type: none"> • Interactive Contractor Training • Improve Your Construction Business • Material currently being developed for Lesotho

Table 3 Available Technical and Managerial Training Material

Required Training Material Yet to be Developed

When commencing this project, the above mentioned literature needs to be adapted into country

specific training material, taking into consideration local conditions, technical standards and type of works to be carried out. It should also be carefully adapted to the level of education among the target group, in relation to the skills of the staff of the contractors, as well as the government implementing agency, i.e., supervisors, inspectors, mechanics, administrative staff, etc. Finally it will be necessary to translate the material to Khmer.

As mentioned earlier in this section, the training materials will be developed by the "upstream" ILO technical assistance project. Project CMB/96/C01 will be the first to use and test these materials during the training of the small-scale contractor's and government staff.

10 Training Programme

Pre-training Phase

It is vital for the success of the training programme that the participants know what will be required of them and what they can expect to gain. This is particularly important in the case of the contractors who during the training period must make key staff available for up to three months. During this period, it is expected that the contracting firms will provide for their staff in terms of costs for accommodation, training materials and allowances. Trainees should also be paid for the duties they perform on site. In addition, these firms may be engaged in other contract work in parallel, therefore, they must be provided with a precise timetable for the training so that they can programme other work accordingly.

This will be arranged by inviting the participating government staff and the contractors to a seminar in advance of starting the training activities. The seminar will explain the strategy and action plan for developing the government's capacity to plan effectively and control gravel road rehabilitation works which will be carried out by small-scale contractors using labour-based/light equipment-supported methods.

The complete training package for the contracting firms can be described in three phases:

Phase 1: Demonstration Phase

The government with technical assistance from the ILO has during the last three years established the efficient use of labour-based methods to rehabilitate and maintain gravel roads. During the initial phase this capacity will be transferred in a structured manner to the contracting firms through a training programme provided to all cadres of staff involved in the programme.

During the demonstration phase the Government will still be in charge of the road works, and a training site will be established for on-the-job teaching purposes where the contractor's staff are seconded to the various operations under close guidance of experienced government provincial staff and project staff acting as instructors.

Phase 2: First Trial Contract

After the demonstration phase, each contracting firm will be given an initial fixed rate trial contract consisting of approximately 4 km of road rehabilitation works which will be executed under close guidance of a project training specialist and local instructors. At this stage, the responsibility for the work sites is transferred to the contractors, however, in a safe environment where the instructors still closely monitor and advise the contractors, thereby avoiding errors and sub-standard works at an early stage.

Ideally, it would be preferable to award trial contracts to all contractors simultaneously, after successful completion of the demonstration phase thereby maintaining the momentum gained

during the initial training. However, due to the demand for intense supervision and support during the initial stage of the first trial contract (site organising, establishing proper logistics procedures, etc), it is recommended that the contracting firms are split into two groups, awarding first trial contracts to firms in one province at the time. Practically, this could be done by first starting of the contracts in Battambang, and then a month later, initiating the contracts in Banteay Meanchey. This will enable the project staff to concentrate the area of operation during the initial phase of the trial contracts avoiding lengthy travel distances for site inspectors/instructors.

Phase 3: Second Trial Contract

When the contractors have successfully completed their first trial contract, they are awarded negotiated contracts of 10 - 15 km road rehabilitation. This is the final show-piece for the contractors. During this phase, the contracting firms will not have access to the close technical support given by the project during the first trial contract, and the government will act in the normal manner as the Client (PRDC) and Engineer (technical Department).

The time schedule for the above training and development programme will depend on the capacity and performance of each of the contractors. However, it is expected that the first trial contract can be completed in 4 to 5 months and that the second trial contract will require a period of one year.

11 Training Methods

Six training methods, described as following, are recommended for the programme:

- subject learning (in classroom)
- project work (in classroom)
- action learning (in classroom)
- demonstrations (in classroom or on-site)
- on-site application
- review sessions (in classroom or on-site)

Subject Learning

This means learning the substance of a topic and its general applications. Exactly which method is most suitable will vary from topic to topic. Parts of some topics will be best conveyed by lecturing and illustrating on the blackboard. For others, the optimal method may be for the participants to study and discuss the theory in groups before going on to solving subject-related exercises. This approach makes the maximum use of the participants' previous experience. Exercises and plenary discussions should be used to reinforce the learning. For the keeping of records and reporting, "in-basket"¹ exercises should be considered. Human relations could be learned effectively through role plays.

Project Work

This involves utilising the participants' knowledge acquired in subject learning in developing the management system for the test-site. Project work will be particularly suited to those topics related to the planning and organisation of the work on-site. For example, following subject learning for planning where they learn the application of the planning principles for labour-based road construction, the participants would prepare a plan for a section of their test road - labour allocation, materials scheduling, equipment scheduling and expected expenditure. When

1 "In-basket" exercises are simulations of the situation in an office where the trainees respond to incoming documentation by taking action, such as registering data and filing.

doing the project work, they should receive support from the instructors. The outcome of the project work, for example a detailed work programme, will then be implemented on the test-site. In this way, the participants are able to put into immediate practice what they learn and experience the effects of it during implementation.

Action Learning

Action learning is suggested for topics which are best learned by the participants devising a procedure based on their insight and experience rather than on theory learned from training material or from the trainer. This is an effective way of learning when local parameters are important and the trainees' own experience and judgement are important inputs. The advantage of employing action learning is that the end product will automatically be tailored to their own situation.

The procedure for action learning would be similar to that of project work. The main difference between use of the two methods is that project work is based on having learned the theory of a skill and applying it to the test road, whereas action learning is used to learn a system of management through devising it with the trainees' own capability and experience applied to the local conditions.

Demonstrations

Some topics, or parts of topics, are best suited to demonstrations. Appropriate setting out methods, for example, are best learned by demonstration after the theory has been taught. For some demonstration purposes a scale model of the test road can be made in the classroom to reinforce the learning of the theory.

A major part of the demonstrations will take place at the road site. Work there will be coordinated with classroom activities so that after a certain topic has been dealt with, trainees are able to see its practical implementation on the test-site.

On-site Application

Following classroom training, trainees will assume functions on the test-site. When arriving on site, they should have the necessary skills to organise and coordinate the work. On the test site, these skills will be improved by working under the guidance of engineers/supervisors and technical assistance staff. On the site, the project engineers will be equipped with the means of monitoring the trainees' performance for use at review sessions back in the classroom. In addition to standard forms for performance evaluation, video equipment will be used to record certain operations for playback in the classroom.

Review Sessions

Having learned a number of skills, and after having applied these on the test-site, the trainees will convene for review. At the review sessions they discuss the experiences they have had. The site instructors give their comments, and video, if recorded, is shown to help with the analysis. To become effective, these sessions will be carefully structured by the training team so that shortcomings are rectified for future site-work and particularly skilful applications are presented in such a way that the other trainees benefit from them. Several alternatives are at hand, plenary discussions, individual presentations, analysis of particular aspects of application, preparation of action plans and additional learning sessions. These sessions can be run on-site or in the classroom, whichever is more convenient.

Review sessions will serve both as a means of monitoring progress made by trainees and of

providing instructions related to project work and on-site application. In particular, physical progress, expenditure and unit costs will be reviewed and compared with what was originally planned. Trainees should make the necessary modifications under the guidance of the trainer and analyse discrepancies.

12 Trainees

It is proposed that a total of eight contracting firms are invited to participate in the first training programme. These eight firms will, after successful completion of the training programme, be awarded contracts to carry out road rehabilitation and periodic maintenance works.

In addition, the project will develop 50 petty contractors who will receive training mainly through on-the-job activities.

13 Classification of Contractors

It is important that newly established labour-based road contractors are registered by the Government and certified to carry out a certain type of contract. This will enable the government to streamline its activities in this sector and provide a uniformity to all projects wishing to use this approach to rural road rehabilitation and maintenance. Furthermore, it will enhance the contracting firms future market prospects and thereby maintain this capacity in the private sector.

14 Training of Local Consultants

Domestic engineering firms could in the future play an important role related to activities such as preparation of tender documents, bill of quantities, inspection and supervision of works as well as assisting government in identification, design and planning of new projects. This arrangement could also provide a means of assisting local village, commune and district committees in design, planning and implementation of minor infrastructure development projects.

However, since domestic consultancy firms have no experience with labour-based road works, it would require a considerable expansion of the training programme. As a first step, it is recommended that the training is limited to establishing the technology among the domestic small-scale contractors and provincial government staff. Once this has been achieved, the Government could, with the assistance of the project, initiate a study to establish the interest and capacity of local consultancy firms to plan, supervise and inspect labour-based road works.

1 PROJECT BRIEF

The project will provide resources to the provincial departments of both MPWT and MRD in Battambang and Banteay Meanchey provinces, to contract out road rehabilitation and periodic maintenance works to eight local small-scale contractors using labour-based work methods. During the project, 150 km of gravel roads will be rehabilitated and 500 km placed under regular maintenance. Project resources will also be applied to develop 50 petty contractors for the routine road maintenance. Necessary training and logistic assistance will be provided to concerned staff of the provincial government staff, to build their capacity to manage local contractors and road works activities. UNCDF will provide capital assistance, estimated at a total of 3.5 million US\$ over a period of 3 years, while technical assistance will be funded by UNDP.

A training centre will be established in the project area where small-scale contractors will be trained in the technical and managerial principles of how to run a labour-based road construction enterprise. At the same time, appropriate training material will be developed by the 'upstream' project, which will be used in this project to train provincial government staff in planning and contract management. Equally important, required financial and administrative procedures will be developed to ensure that provincial government departments effectively assume their Client duties vis-a-vis the contracting firms.

Once the contractors have successfully completed their training, they will be equipped with a set of light equipment and hand tools, financed through a loan agreement with a local lending institution, and awarded contracts for rehabilitation and maintenance of rural roads as conventional private sector firms.

2 PROJECT STRATEGY

It is expected that the contractors will take full responsibility for all aspects of undertaking road work contracts awarded by the Government according to normal contract conditions, including the financial aspects such as accounting, obtaining credits, financing of equipment, etc. To ensure this goal, an involvement of a local bank/lending institution is necessary for the implementation of this project.

The contractors will need to work through a local banking institution (i) to finance the required equipment and hand tools and (ii) for assistance in the daily accounting and financial management. A selected bank will enter into an agreement with the Government and will be involved in the distribution of the equipment to the contractors under a loan agreement and for the repayment of these loans.

The Government will make available tools and equipment, partly from the existing force account units and partly from donor sources, required for the contractors who have been selected for training. After the equipment has been inspected and verified as being according to requested specifications, it will be handed over to the Bank for their distribution to the trained and certified contractors as instructed by the project. Each contractor will then enter into a loan agreement with the Bank for the financing of its equipment. This agreement will be on a fully commercial basis according to normal banking procedures in terms of security, interest rates, repayment schedules, etc. Funds from the repayment of these loans will be transferred to a revolving fund account belonging to the Government, but to be used only for project activities.

These services rendered by the Bank, will be formalised through a contract agreement between the Government and the Bank. The Bank will use the interest charges to cover the costs of its services.

3 SERVICES PROVIDED BY THE BANK

3.1 Objectives

The main objectives of the Bank services are to ensure (i) the efficient recovery of the equipment loans rendered to the contractors and (ii) sound and efficient financial management of the accounts of the construction firms. This will be ensured through the below described services provided by the Bank.

3.2 List of Services

- (i) Upon receipt of the equipment from the Government, the Bank will inspect the equipment and assure that it corresponds to the numbers and specifications as stated by the Government,
- (ii) screening the credit worthy contractors by applying a set of valuation criteria which has been agreed upon with the project,
- (iii) development of appropriate loan agreements between the Bank and the contractor firms by applying conditions for repayment approved by and acceptable to the project,
- (iv) upon signing loan agreements, handing over the equipment to the contractors together with a signed condition inspection certificate,
- (v) recovery of loan and interest payments on a regular basis in accordance to the contract agreement and placing of the recovered funds in a project revolving fund account,
- (vi) regular monitoring of the conditions and the utilization of the equipment and the financial performance of the contractors as regards to their credit worthiness and taking appropriate legal measures in the event of major delinquency,
- (vii) executing payments to the contractors, based on payment certificates issued by the Government, applying a sound banking system and maintaining records for each of the construction firms, showing relevant contract, payment assessment and summarisation,
- (viii) assisting the construction firms with their accounting and financial management through the provision of counselling and technical guidance,
- (ix) opening and maintaining a revolving fund account accruing interest and providing regular statements for this account.

3.3 The Composition of the Responsible Unit in the Bank

It is expected that the selected Bank will have on its staff the normal banking staff made up of managers, accountants, clerks and others of requisite training and experience.

Included in the services to be performed by the Bank will be the appraisal and screening of the contractors for credit worthiness. The Bank therefore should have on its staff or be able to produce satisfactory evidence that it can obtain the services of a project analyst who can adequately perform this service.

On receipt of the pieces of equipment, the Bank will need to satisfy itself that all items are in good working condition. Also the newly trained contractors will continue to require assistance in the management and running of the newly acquired equipment. To be able to perform these functions the Bank will need to possess the services of mechanical support staff. The Bank will be required to produce satisfactory evidence that it has or can secure such services.

After entering into loan agreement with the contractors, the Bank will at regular intervals need to assess the performance of the contractors in the field. For this function the Bank will require the services of a civil engineer. His input is estimated to be 2 man-months per year during the entire loan period.

Evidence will be required from the Bank that it has or has made satisfactory arrangements to obtain the services of the above specialists whenever they are required.

3.4 Reporting

The following reporting schedule is proposed:

- regular and up to date bank statements of the Government recovery account to be provided once a month,
- provision of quarterly loans and interest financial statements for each contractor as well as a combined statement for all the contractors,
- an inception report covering the management and services to be provided should be submitted 2 months from the beginning of the assignment,
- half yearly reports on the performance of the contractors,
- a completion report at the end of each loan agreement and a summary report when all loans have been recovered.

4 RESPONSIBILITIES OF THE GOVERNMENT

The Government through the Provincial Public Works and Rural Development Departments will:

- *provide regular and continuous work to the contractors during the entire period of loan recovery,*
- provide the required hand tools and light equipment and hand them over to the Bank verifying that the equipment is in order and according to requested specifications,
- submit the names of the contractors which the project recommends should be supplied with equipment,
- submit a detailed list describing the amount and type of equipment to be provided to each contractor
- ensure that all cheques are issued in the joint name of the contractor and the Bank until full loan recovery has been achieved.

5 SELECTION OF BANK

Initially discussions will be held with ACLEDA (a UNDP project) for the provision of the required services but the project may also invite selected domestic banks to submit proposals for the services. This proposal should include information such as:

- description of the bank and its general experience in banking and in particular in relation to this assignment,
- details and composition of professional staff in the relevant area including proposed external specialist personnel the Bank envisages to engage.
- time effort and approach to assignment,
- cost estimates showing rates of professional fees, secretarial and drafting staff, costs for reporting, office equipment and transport.

The proposals would then be evaluated by the project on the basis of the above criteria and the adequacy and responsiveness of the proposals in relation to the terms of reference.

6 OPERATION

It is important that the Bank designates a Unit to deal with the project on all issues of the

labour-based contractors. Possible units in the Bank to undertake this are an Engineering Unit or a Project Appraisal Unit. The head of this Unit should be a senior manager entrusted with full powers to take decisions on behalf of the Bank.

The Unit, when identified, should form a standing committee with the project. This committee should comprise of the Directors of the PWDs and PDRDs, the Project Adviser, the Director of the Bank Unit and its operational officer.

Some functions of the Bank Unit:

- (i) All correspondence between the Bank and the project on the labour-based contractors should be with the Unit.
- (ii) List of beneficiary contractors will be submitted to the Unit which will arrange for their appraisal.
- (iii) Equipment for the project will be received by the Unit.
- (iv) It is from the Unit that the contractors will receive the sets of equipment after appraisal and approval.
- (v) All payment cheques issued by the Government for joint payment will be presented to the Unit first. The Unit will then negotiate with the contractor the amount for loan repayments and the remaining balance which will be released to him. On conclusion of this negotiation the Unit will then instruct the Branch of the Bank where the contractor keeps his account to release the agreed amount.

The labour-based contractors should be encouraged to form an Association. Common issues likely to cause misunderstanding between the contractors and the Bank can be brought before the project/Bank Standing Committee for settlement. The contractors will be represented by the executive members of their Association.

Similarly, all issues between Government and the Bank needing clarification will be settled at the Standing Committee level.

In their formative years, the labour-based contractors will require advice and support on financial matters. The Unit will assist or will direct the contractor to the appropriate unit of the Bank for such services.

7 TERMS OF LOANS

7.1 Recovery of Loans

The Provincial technical Departments are responsible as the Engineer for assessing the amounts due to each contractor at every stage of the contract period. Cheques for the completed works are issued by the Governor in the joint name of the contractor and the Bank. This way, no other Bank has access to the cheque. When the cheque is cashed, the Bank can gradually recover the loan by securing an agreed portion of the amount as a repayment of the loan. To ensure that this arrangement is followed, the Bank must establish procedures so that only the Unit responsible for the contractors are authorized to handle these cheques, to avoid the entire amount of the cheques being cashed with no repayments made to the equipment loan.

7.2 Repayment Period

The repayment period should be in the range of 2 - 3 years depending on the amount of equipment provided to the contractor.

7.3 Security

The Bank may require a security from the contractor in the form of landed property, bonds, stocks, etc.

7.3 Interest Rates

The project and the Bank should agree upon an appropriate level of interest rates for the equipment loans. These rates must cover the running expenses and fees of the Bank for the management and handling of the loans. In addition, issues such as the existing interest rate level in the country, inflation, exchange rates between local currency and foreign currencies (US\$) should be considered when determining and adjusting the level of the interest rate. A certain amount of the generated interest should be channelled back to the project revolving fund account.

7.4 Restrictions on Usage

Equipment financed under the loan should be used solely for the purpose of the Project, and shall not be used for any other purpose except with the authorization of the project in consultation with the Bank. Only after an agreed period of time or after the contractor has completed a certain amount of works will he be released and be free to use the equipment for other assignments. This period should at least cover the project period. However, the Government must guarantee that it can provide a regular and continuous amount of work during the bonding period.

On the following pages are outlined the proposed job descriptions for the members of the Technical Assistance Team:

- Project Adviser
- Training Engineer
- Maintenance Engineer
- National Professional Road Engineers
- National Professional Training Engineer

**INTERNATIONAL LABOUR OFFICE
Technical Cooperation Programme**

Country: Cambodia
Project Code: CMB/96/C01
PASREC No:
Date Issued: November 1995
Closing date for Applications:

ANNOUNCEMENT OF VACANCY

Applications from both men and women will be equally welcome

Project Title: Labour-based Roads Rehabilitation and Contractors Development Project
Title of Post: Project Adviser
Duty Station: Battambang, Cambodia
Duration of Appointment: 12 months with possibility of extension
Scheduled Starting Date: July 1996
Terms of Appointment: See overleaf

GENERAL PROJECT INFORMATION

The ILO Labour-based Infrastructure Rehabilitation Project was launched as an emergency programme in 1992, as part of the UNDP/ILO Employment Generation Programme to (i) assist the rehabilitation of vital infrastructure in the Northern provinces, in particular rural roads and irrigation schemes, and (ii) to rapidly provide employment and income to rural areas devastated by the civil war. So far, it has reconstructed more than 400 km of secondary and tertiary roads, maintained about 700 km, rehabilitated several irrigation schemes and generated 1.5 million workdays. It has trained over 300 counterpart personnel and a small number of contractors in the use of labour-based work methods.

Due to the success of this programme, the Government of Cambodia has made a strong commitment to the use of labour-based appropriate technology (LBAT) and has established an inter-ministerial Task Force to coordinate and promote such efforts. The ILO now sees its future role in terms of LBAT technical assistance as (i) maintaining the valuable experience developed during the past years in terms of technology, work methods, organisation and implementation, and (ii) establishing these concepts within the relevant government institutions by building up the capacity in the government and the private sector.

To achieve these goals, ILO will provide technical assistance through two projects with the objective of creating a capacity within government to plan, design, manage and implement labour-based infrastructure works involving domestic small-scale and petty contractors in the execution of the physical works. These projects will be operating at two levels:

- (i) At *upstream* level, UNDP has agreed to finance an ILO technical assistance project focusing on support to the LBAT Task Force and the Institute of Technology of Cambodia, the development of management tools, such as technical design and work methods, contract management procedures, administrative and financial procedures and corresponding training programmes for the effective implementation of a LBAT rural infrastructure works in the country.
- (ii) At *downstream* level, through this project, ILO will provide training and technical advisory support to implementation of labour-based rural infrastructure works within the framework of CARERE2.

The downstream project will provide resources to the provincial departments of both MPWT and MRD in Battambang and Banteay Meanchey provinces, to contract out road rehabilitation and periodic maintenance works to eight local small-scale contractors using labour-based work methods. During the project, 150 km of gravel roads will be rehabilitated and 500 km placed under regular maintenance. Project resources will also be applied to develop 50 petty contractors for the routine road maintenance. Necessary training and logistic assistance will be provided to concerned staff of the provincial government staff, to build their capacity to manage local contractors and road works activities.

UNCDF will provide capital assistance, estimated at a total of 3.5 million US\$ over a period of 3 years, while technical assistance will be funded by UNDP.

A training centre will be established in the project area where small-scale contractors will be provided training in the technical and managerial principles of how to run a labour-based road construction enterprise. At the same time, appropriate training material will be developed by the upstream project, which will be used in this project to train provincial government staff in contract management. Equally important, required financial and administrative procedures will be developed to ensure that provincial government departments effectively assume their client duties vis-a-vis the contracting firms.

Once the contractors have successfully completed their training, they will be equipped with a set of light equipment and hand tools financed through a loan agreement with a local lending institution and awarded contracts for rehabilitation and maintenance of feeder roads as conventional private sector firms.

DESCRIPTION OF DUTIES

General

This senior TA team member will be *the Project Adviser* who is responsible for advising on overall planning and implementation of all project activities as outlined in the project document. He/she will coordinate the work of a team consisting of a Training Engineer, a Maintenance Engineer, three National Roads Engineers and local project support staff, national counterparts and consultants. The PA will liaise closely with the Public Works Departments of Battambang and Banteay Meanchey and the CARERE2 Area Development Managers concerning planning of major activities, progress, problems arising and before major decisions are taken. He/she will report through the Chief Technical Adviser of the "upstream" project to the Director of the ILO Area Office in Bangkok.

Specific

A major activity at the beginning of the project will be to prepare a joint work plan together with the CTA of the "upstream" project, thereby ensuring that the training activities of each of the two projects are properly coordinated and can be delivered in a timely manner. This work plan will include the following activities:

- (a) Advise and assist on the establishment of a capacity within the PWDs to plan, implement, and monitor road rehabilitation and maintenance works executed by contractors.
- (b) Manage and participate in the development, establishment and presentation of training courses and seminars on labour-based road construction and maintenance works.
- (c) Provide the management and coordination of all project inputs provided by the Government, UNDP, UNCDF, UNOPS, WFP and/or others, ensuring that the inputs are effectively used.
- (d) Liaise with other donor agencies (e.g. CARERE2, UNDP, CARE, etc.) and ILO project staff concerned with the project to ensure a smooth and effective implementation of the project.
- (e) Assist the government in preparing work plans, implementation and material schedules and other programmes for the smooth implementation of the project.
- (f) Prepare equipment requirements for the training sites and initial trial contracts.
- (g) Prepare the technical specifications for all procurement of plant and equipment, tools, materials, both local and overseas.
- (h) Negotiate with local banking institutions appropriate arrangements for the contractors' acquisition of tools and equipment.
- (i) Assist in defining the detailed organisational and administrative framework in which the project will be implemented.
- (j) Liaise with relevant government departments (i.e. Department of Public Works, Rural Development, Planning, Finance, etc.) concerned with the project, particularly with respect to the development of appropriate administrative and financial procedures facilitating the integration of the project activities into the administrative system and procedures of the government agencies.

- (k) Monitor and adjust as appropriate, in close consultation with the PWDs, of systems, procedures and regulations with a view to optimising the prospects of expanding the medium and long term application of labour-based domestic contractors for road construction and maintenance.
- (l) Participate in the further development/adaption of standard documentation, guidelines and procedures related to the implementation of labour-based works including technical design standards, work methods, organisation, contract documents, bill of quantities, tendering documents, procedures for contract award, etc. based on initial field trials where the newly developed procedures are tested.
- (m) Monitor the work of the project and PWD staff in the area of contract supervision and quality assurance.
- (n) Monitor payment procedures to contractors with specific reference to the requirements of regular (monthly) payments.
- (o) Assist in the development of an appropriate cost accounting system for project contracts, preferably as a computerised system.
- (p) Assist in the establishing of appropriate unit rates for the various categories of work activities executed by the contractors.
- (q) Define and prepare terms of reference for short-term consultancies.
- (r) Recruit and supervise short-term consultants, and evaluate their outputs;
- (s) Facilitate the effective presentation of the project to visitors, in a planned manner which ensures that suitable on-site facilities and relevant data are available at all times.
- (t) Assist other relevant provincial departments in identifying the possibilities for labour-based infrastructure works.
- (u) Assist in formulating and preparing proposals for labour-based projects and discuss these with the government and donors.
- (v) Provide the daily management of the project team and its various project activities.

In addition, the Project Adviser will assist, to the extent that his principal responsibilities allow, CARERE and the ILO in their other activities in the country, in particular those relating to and which may benefit the labour-based infrastructure works programmes and the promotion of this type of projects in Cambodia.

EXPERIENCE AND QUALIFICATIONS REQUIRED

- (a) A degree in civil engineering;
- (b) Not less than 10 years of experience in road construction and maintenance management, with at least 5 years working in a senior capacity with labour-based techniques for rural infrastructure works in developing countries;
- (c) Experience in private sector development or in the management of contracts systems and procedures in the civil engineering sector;
- (d) A proven managerial capability and leadership ability in the context of collaboration with governments of developing countries, with local representatives of donor agencies, and with a heterogeneous team composed of consultants, experts, and local collaborators of different educational and cultural background;
- (e) An ability to establish good working relations with local and international staff with a background different from his/her own and be able to communicate effectively and impart his/her knowledge to subordinates and national counterparts;
- (f) An ability to manage project monitoring, administrative and accounting systems with the assistance of personal computers;
- (g) A willingness to frequently travel and work in the rural areas where the project's main activities are located;
- (h) An ability to write clear and concise reports in English.

LANGUAGE

Fluent in both spoken and written English. Knowledge of French or Khmer would be regarded as a

considerable advantage.

**INTERNATIONAL LABOUR OFFICE
Technical Cooperation Programme**

Country: Cambodia
Project Code: CMB/96/C01
PASREC No:
Date Issued: November 1995
Closing date for Applications:

ANNOUNCEMENT OF VACANCY

Applications from both men and women will be equally welcome

Project Title: Labour-based Roads Rehabilitation and Contractors Development Project
Title of Post: Training Engineer
Duty Station: Battambang, Cambodia
Duration of Appointment: 12 months with possibility of extension
Scheduled Starting Date: July 1996
Terms of Appointment: See overleaf

GENERAL PROJECT INFORMATION

The ILO Labour-based Infrastructure Rehabilitation Project was launched as an emergency programme in 1992, as part of the UNDP/ILO Employment Generation Programme to (i) assist the rehabilitation of vital infrastructure in the Northern provinces, in particular rural roads and irrigation schemes, and (ii) to rapidly provide employment and income to rural areas devastated by the civil war. So far, it has reconstructed more than 400 km of secondary and tertiary roads, maintained about 700 km, rehabilitated several irrigation schemes and generated 1.5 million workdays. It has trained over 300 counterpart personnel and a small number of contractors in the use of labour-based work methods.

Due to the success of this programme, the Government of Cambodia has made a strong commitment to the use of labour-based appropriate technology (LBAT) and has established an inter-ministerial Task Force to coordinate and promote such efforts. The ILO now sees its future role in terms of LBAT technical assistance as (i) maintaining the valuable experience developed during the past years in terms of technology, work methods, organisation and implementation, and (ii) establishing these concepts within the relevant government institutions by building up the capacity in the government and the private sector.

To achieve these goals, ILO will provide technical assistance through two projects with the objective of creating a capacity within government to plan, design, manage and implement labour-based infrastructure works involving domestic small-scale and petty contractors in the execution of the physical works. These projects will be operating at two levels:

- (i) At *upstream* level, UNDP has agreed to finance an ILO technical assistance project focusing on support to the LBAT Task Force and the Institute of Technology of Cambodia, the development of management tools, such as technical design and work methods, contract management procedures, administrative and financial procedures and corresponding training programmes for the effective implementation of a LBAT rural infrastructure works in the country.
- (ii) At *downstream* level, through this project, ILO will provide training and technical advisory support to implementation of labour-based rural infrastructure works within the framework of CARERE2.

The downstream project will provide resources to the provincial departments of both MPWT and MRD in Battambang and Banteay Meanchey provinces, to contract out road rehabilitation and periodic maintenance works to eight local small-scale contractors using labour-based work methods. During the project, 150 km of gravel roads will be rehabilitated and 500 km placed under regular maintenance. Project resources will also be applied to develop 50 petty contractors for the routine road maintenance.

Necessary training and logistic assistance will be provided to concerned staff of the provincial government staff, to build their capacity to manage local contractors and road works activities. UNCDF will provide capital assistance, estimated at a total of 3.5 million US\$ over a period of 3 years, while technical assistance will be funded by UNDP.

A training centre will be established in the project area where small-scale contractors will be provided training in the technical and managerial principles of how to run a labour-based road construction enterprise. At the same time, appropriate training material will be developed by the upstream project, which will be used in this project to train provincial government staff in contract management. Equally important, required financial and administrative procedures will be developed to ensure that provincial government departments effectively assume their client duties vis-à-vis the contracting firms.

Once the contractors have successfully completed their training, they will be equipped with a set of light equipment and hand tools financed through a loan agreement with a local lending institution and awarded contracts for rehabilitation and maintenance of feeder roads as conventional private sector firms.

DESCRIPTION OF DUTIES

General

A Project Adviser will be responsible for advising on overall planning and implementation of all project activities as outlined in the project document. He/she will coordinate the work of a team consisting of *the Training Engineer*, a Maintenance Engineer, three National Roads Engineers and local project support staff, national counterparts and consultants.

Under the direction and close collaboration with the Project Adviser, the Training Engineer will be responsible for the overall planning, management and coordination of all training activities as outlined in the project document. He/she will coordinate the training inputs from a team consisting of a National Professional Training Engineer, national counterparts and consultants. He/she will also liaise directly with the *upstream* project training related activities, and the MPWT training division and its training programmes.

Specific

- (a) The development of the Training Centre including the premises, its staff and equipment.
- (b) Management of the Training Centre including its field activities.
- (c) Carry out detailed training needs assessment of the various cadres of government and contractors' staff.
- (d) Supervise and coordinate training components on maintenance of equipment and business management.
- (e) Development of training management systems including selection of trainees, performance evaluation, certification, registration, etc.
- (f) Prepare a day to day programme for the first training courses.
- (g) Train counterpart staff. Provide the instructors with guidelines on training methodology for practical oriented courses for adult professionals.
- (h) Conduct training at the Training Centre's courses.
- (i) Carry out an in-built post-evaluation of the performance of the first courses.
- (j) Participate in refining the training material after the first course taking into consideration the experience made during the initial courses.
- (k) Facilitate the effective presentation of the training centre and sites to visitors in a planned manner which ensures that suitable on-site facilities and relevant data are available at all times.

In addition, the Training Engineer will assist, to the extent that his principal responsibilities allow, CAREERE and the ILO in their other activities in the country, in particular those relating to and which may benefit the labour-based infrastructure works programmes and the promotion of this type of projects in Cambodia.

EXPERIENCE AND QUALIFICATIONS REQUIRED

- (a) A degree in civil engineering;
- (b) Not less than 10 years of experience in road construction and maintenance management, with at least 5 years working in a senior capacity with labour-based techniques for rural infrastructure works in developing countries;
- (c) A thorough knowledge, experience and understanding of the use of local resources for the construction and maintenance of roads;
- (d) A solid experience and understanding of the principles and practice of construction management, management training for small businesses and enterprise development;
- (e) A proven ability to impart his/her knowledge to others both in classroom and on-the-job training;
- (f) An ability to establish good working relations with local and international staff with a background different from his/her own and be able to communicate effectively with different levels of staff;
- (g) A willingness to live and work in the rural area where the project's main activities are located;
- (h) An ability to write clear and concise training material.

LANGUAGE

Fluent in both spoken and written English. Knowledge of French or Khmer would be regarded as a considerable advantage.

**INTERNATIONAL LABOUR OFFICE
Technical Cooperation Programme**

Country: Cambodia
Project Code: CMB/96/C01
PASREC No:
Date Issued: November 1995
Closing date for Applications:

ANNOUNCEMENT OF VACANCY

Applications from both men and women will be equally welcome

Project Title: Labour-based Roads Rehabilitation and Contractors Development Project
Title of Post: Maintenance Engineer
Duty Station: Battambang, Cambodia
Duration of Appointment: 12 months with possibility of extension
Scheduled Starting Date: July 1996
Terms of Appointment: See overleaf

GENERAL PROJECT INFORMATION

The ILO Labour-based Infrastructure Rehabilitation Project was launched as an emergency programme in 1992, as part of the UNDP/ILO Employment Generation Programme to (i) assist the rehabilitation of vital infrastructure in the Northern provinces, in particular rural roads and irrigation schemes, and (ii) to rapidly provide employment and income to rural areas devastated by the civil war. So far, it has reconstructed more than 400 km of secondary and tertiary roads, maintained about 700 km, rehabilitated several irrigation schemes and generated 1.5 million workdays. It has trained over 300 counterpart personnel and a small number of contractors in the use of labour-based work methods.

Due to the success of this programme, the Government of Cambodia has made a strong commitment to the use of labour-based appropriate technology (LBAT) and has established an inter-ministerial Task Force to coordinate and promote such efforts. The ILO now sees its future role in terms of LBAT technical assistance as (i) maintaining the valuable experience developed during the past years in terms of technology, work methods, organisation and implementation, and (ii) establishing these concepts within the relevant government institutions by building up the capacity in the government and the private sector.

To achieve these goals, ILO will provide technical assistance through two projects with the objective of creating a capacity within government to plan, design, manage and implement labour-based infrastructure works involving domestic small-scale and petty contractors in the execution of the physical works. These projects will be operating at two levels:

- (i) At *upstream* level, UNDP has agreed to finance an ILO technical assistance project focusing on support to the LBAT Task Force and the Institute of Technology of Cambodia, the development of management tools, such as technical design and work methods, contract management procedures, administrative and financial procedures and corresponding training programmes for the effective implementation of a LBAT rural infrastructure works in the country.
- (ii) At *downstream* level, through this project, ILO will provide training and technical advisory support to implementation of labour-based rural infrastructure works within the framework of CARERE2.

The downstream project will provide resources to the provincial departments of both MPWT and MRD in Battambang and Banteay Meanchey provinces, to contract out road rehabilitation and periodic maintenance works to eight local small-scale contractors using labour-based work methods. During the project, 150 km of gravel roads will be rehabilitated and 500 km placed under regular maintenance. Project resources will also be applied to develop 60 petty contractors for the routine road maintenance.

Necessary training and logistic assistance will be provided to concerned staff of the provincial government staff, to build their capacity to manage local contractors and road works activities. UNCDF will provide capital assistance, estimated at a total of 3.5 million US\$ over a period of 3 years, while technical assistance will be funded by UNDP.

A training school will be established in the project area where small-scale contractors will be provided training in the technical and managerial principles of how to run a labour-based road construction enterprise. At the same time, appropriate training material will be developed by the upstream project, which will be used in this project to train provincial government staff in contract management. Equally important, required financial and administrative procedures will be developed to ensure that provincial government departments effectively assume their client duties vis-à-vis the contracting firms.

DESCRIPTION OF DUTIES

General

A Project Adviser will be responsible for advising on overall planning and implementation of all project activities as outlined in the project document. He/she will coordinate the work of a team consisting of a Training Engineer, *the Maintenance Engineer*, three National Road Engineers and local project support staff, national counterparts and consultants.

Under the direction and close collaboration with the Project Adviser, the Maintenance Engineer will be responsible for the overall advising on planning, management and coordination of all road maintenance activities as outlined in the project document. He/she will coordinate the maintenance related inputs from a team consisting of two National Professional Road Engineers, national counterparts and consultants.

Specific

With close cooperation with the government departments, the Maintenance Engineer will be involved in the following specific activities:

- (a) Identify the secondary and tertiary road network in the two provinces which is in a maintainable condition.
- (b) Survey and inventorise these roads, resulting in a detailed database which describe the condition and location of all road components.
- (c) Identify and collate all programmed road upgrading and rehabilitation works envisaged in the project area including interventions from other projects.
- (d) Develop appropriate levels and quality norms for routine, recurrent and periodic road maintenance works.
- (e) Prepare a detailed road priority plan for maintenance funding.
- (f) Determine available local resources for road maintenance in the project area, including other donor support (funds, staff, equipment, materials, petty contractors, etc.).
- (g) Prepare a comprehensive road maintenance implementation plan for the two provinces.
- (h) Determine required inputs in terms of funding, training, tools and equipment, consultancy inputs, etc.
- (i) Identify possible potential petty contractors who can take responsibility for routine road maintenance of sections of 5 - 20 km.
- (j) Assist in training needs assessments.
- (k) Participate in training courses for government staff and petty contractors.
- (l) Define the detailed organisational and administrative framework in which the road maintenance programme will be implemented.
- (m) Integrate the newly developed technology and procedures within relevant provincial

- departments.
- (n) Provide advisory support to the implementation of road maintenance works.
 - (o) Monitor and adjust as appropriate, in close consultation with the PWDs, of systems, procedures and regulations with a view to optimising the prospects of expanding the involvement of small-scale and petty contractors for road maintenance works.
 - (p) Participate in the further development/adaption of standard documentation, guidelines and procedures related to the implementation of labour-based road maintenance works including technical design standards, work methods, organisation, contract documents, procedures for contract awarding, etc. based on initial field trials where the newly developed procedures are tested.
 - (q) Monitor the work of the project and PWD staff in the area of contract supervision and quality assurance.
 - (r) Monitor payment procedures to the contractors with specific reference to the requirements of regular (monthly) payments.
 - (s) Assist in the development of an appropriate cost accounting system for road maintenance contracts, preferably as a computerised system.
 - (t) Assist in the establishing of appropriate unit rates for road maintenance activities.
 - (u) Provide the daily management of the project team activities related to road maintenance works.

In addition, the Maintenance Engineer will assist, to the extent that his principal responsibilities allow, CARERE and the ILO in their other activities in the country, in particular those relating to and which may benefit the labour-based infrastructure works programmes and the promotion of this type of projects in Cambodia.

EXPERIENCE AND QUALIFICATIONS REQUIRED

- (a) A degree in civil engineering;
- (b) Not less than 10 years of experience in road construction and maintenance management, with at least 5 years working in a senior capacity with labour-based techniques for rural infrastructure works in developing countries;
- (c) A thorough knowledge, experience and understanding of the use of local resources for the rehabilitation and maintenance of roads;
- (d) Experience in private sector development or in the management of contracts systems and procedures in the civil engineering sector;
- (e) A proven managerial capability and leadership ability in the context of collaboration with governments of developing countries, with local representatives of donor agencies, and with a heterogeneous team composed of consultants, experts, and local collaborators of different educational and cultural background;
- (f) An ability to establish good working relations with local and international staff with a background different from his/her own and be able to communicate effectively and impart his/her knowledge to subordinates and national counterparts;
- (g) A willingness to frequently travel and work in the rural areas where the project's main activities are located;
- (h) An ability to write clear and concise reports.

LANGUAGE

Fluent in both spoken and written English. Knowledge of French or Khmer would be regarded as a considerable advantage.

JOB DESCRIPTION

NATIONAL PROFESSIONAL ROAD ENGINEERS

Project Title: Labour-based Roads Rehabilitation and Contractors Development Project
Title of Post: National Professional Road Engineers
Duty Station: Battambang and Sisophon
Duration of Appointment: 2 x 36 months
Scheduled Starting Date: July 1996

PROJECT INFORMATION

The project will provide resources to the provincial departments of both MPWT and MRD in Battambang and Banteay Meanchey provinces, to contract out road rehabilitation and periodic maintenance works to eight local small-scale contractors using labour-based work methods. During the project, 150 km of gravel roads will be rehabilitated and 500 km placed under regular maintenance. Project resources will also be applied to develop 50 petty contractors for the routine road maintenance. Necessary training and logistic assistance will be provided to concerned staff of the provincial government staff, to build their capacity to manage local contractors and road works activities. UNCDF will provide capital assistance, estimated at a total of 3.5 million US\$ over a period of 3 years, while technical assistance will be funded by UNDP.

A training centre will be established in the project area where small-scale contractors will be provided training in the technical and managerial principles of how to run a labour-based road construction enterprise. At the same time, appropriate training material will be developed by the upstream project, which will be used in this project to train provincial government staff in contract management. Equally important, required financial and administrative procedures will be developed to ensure that provincial government departments effectively assume their client duties vis-à-vis the contracting firms.

Once the contractors have successfully completed their training, they will be equipped with a set of light equipment and hand tools financed through a loan agreement with a local lending institution and awarded contracts for rehabilitation and maintenance of feeder roads as conventional private sector firms.

DUTIES AND RESPONSIBILITIES

General

Under the direction of the Project Adviser, the National Professional Road Engineers will assist in the planning, implementation and monitoring of all road rehabilitation and maintenance activities in a given province. He/She will work as a member of a technical assistance team which includes the Project Adviser, a Training Engineer, a Maintenance Engineer, local project staff and consultants.

Specific

The National Road Engineers will initially be involved in the training of government and contractors' staff, in particular on-the-job training activities. Once the contractors have successfully completed their training during the demonstration phase, the NREs will be assigned to one province each, mainly involved with supervision and technical advisory support to the road rehabilitation and maintenance works. They will carry out his/her duties in close collaboration with provincial government counterparts, consisting of the following activities:

- (a) Participate in establishing provincial road rehabilitation and maintenance programmes.
- (b) Design and plan works, organise and supervise works to ensure adequate quality and progress.
- (c) Assist the PWDs in contract preparation, award and management.
- (d) Assist in organising and implementing a system of careful management, monitoring and recording of project personnel, equipment and material inputs.
- (e) Assist local contractors in the organisation of works and the mobilisation of labour.
- (f) Organise procedures for adequate daily and weekly site reporting and consolidate the information into monthly progress reports.
- (g) Produce maintenance plans, set up arrangements for maintenance, and guide and supervise maintenance works carried out by the small-scale and petty contractors.

EXPERIENCE AND QUALIFICATIONS REQUIRED

- (a) A degree in civil engineering followed by at least four years professional experience. He/she should also have some experience in the use of labour-based methods for road construction and maintenance works;
- (b) An ability to establish good working relations with local and international staff with a background different from his/her own and be able to communicate effectively and impart his/her knowledge to national counterparts;
- (c) A willingness to live and work in the rural areas where the project's main activities are located.

LANGUAGE

Fluent in both spoken and written English.

JOB DESCRIPTION

NATIONAL PROFESSIONAL ROAD ENGINEERS

Project Title: Labour-based Roads Rehabilitation and Contractors Development Project
Title of Post: National Professional Training Engineer
Duty Station: Battambang and Sisophon
Duration of Appointment: 24 months
Scheduled Starting Date: July 1996

PROJECT INFORMATION

The project will provide resources to the provincial departments of both MPWT and MRD in Battambang and Banteay Meanchey provinces, to contract out road rehabilitation and periodic maintenance works to eight local small-scale contractors using labour-based work methods. During the project, 150 km of gravel roads will be rehabilitated and 500 km placed under regular maintenance. Project resources will also be applied to develop 50 petty contractors for the routine road maintenance. Necessary training and logistic assistance will be provided to concerned staff of the provincial government staff, to build their capacity to manage local contractors and road works activities. UNCDF will provide capital assistance, estimated at a total of 3.5 million US\$ over a period of 3 years, while technical assistance will be funded by UNDP.

A training centre will be established in the project area where small-scale contractors will be provided training in the technical and managerial principles of how to run a labour-based road construction enterprise. At the same time, appropriate training material will be developed by the upstream project, which will be used in this project to train provincial government staff in contract management. Equally important, required financial and administrative procedures will be developed to ensure that provincial government departments effectively assume their client duties vis-à-vis the contracting firms.

Once the contractors have successfully completed their training, they will be equipped with a set of light equipment and hand tools financed through a loan agreement with a local lending institution and awarded contracts for rehabilitation and maintenance of feeder roads as conventional private sector firms.

DUTIES AND RESPONSIBILITIES

General

Under the direction and close collaboration with the Training Engineer, the National Professional Training Engineer will assist in the planning and execution of all training activities. He/She will assist in the coordination of various training inputs from a team which includes the Training Adviser, the Project Adviser, two National Professional Road Engineers, local project staff, national counterparts and consultants. He/she will also closely liaise with the *upstream* project training related activities, and the MPWT training division and its training programmes.

Specific

- (a) Take part in the development of the training school including the premises, its staff and equipment.
- (b) Assist in the efficient management of the training school.
- (c) Assist in the further updating of curricular for government staff and contractors for labour-based road improvement and maintenance works.

- (d) Conduct training within the training schools courses.
- (e) Participate in the development and implementation of training management systems, including training needs assessment, selection of trainees, performance evaluation, certification and registration.
- (f) Assist in the recruitment and training of instructional staff for the school.
- (g) Liaising with other Government departments involved in labour-based construction techniques.
- (h) Assist in the preparation of annual budget and work programme for the school.
- (i) Present the training school to visitors in a planned manner which ensures that suitable on-site facilities and relevant data are available at all times.

EXPERIENCE AND QUALIFICATIONS REQUIRED

- (a) A degree in civil engineering followed by at least four years professional experience. He/she should also have some experience in the use of labour-based methods for road construction and maintenance works;
- (b) An ability to establish good working relations with local and international staff with a background different from his/her own and be able to communicate effectively and impart his/her knowledge to the contractors and national counterpart staff;
- (c) A willingness to live and work in the rural areas where the project's main activities are located.

LANGUAGE

Fluent in both spoken and written English.

REPAYMENT OF EQUIPMENT BY THE SMALL-SCALE CONTRACTORS

Background

It is proposed that the contractors, who will carry out rehabilitation and periodic maintenance works, will acquire necessary equipment through a hire-purchase agreement with a local bank or credit institution. After identifying the participating contractors, the project will, in close consultations with these firms, determine their requirements for additional equipment. The Government will, with the assistance of the project, then procure the equipment and bring it into Cambodia. Under a separate agreement with a local bank or credit institution, the Government will transfer the equipment to a local bank/credit institution.

The bank under individual agreements with the successfully trained contractors, using normal bank procedures, will hire-purchase the equipment to the contractors. The service to be provided by the bank are detailed in Annex 4 The Role of a Local Bank. In a worst case scenario, the contractors may have to purchase all equipment as identified necessary in order to carry out the works. This equipment has been identified as:

2 pedestrian rollers (950 kg)	26,000
1 Etean with water bowser	16,000
1 pick-up	16,000
1 set of hand tools	4,000
1 motorcycle	1,500
2 bicycles	500
Total	US\$ 64,000

The choice of equipment is based on the experience gathered during the existing labour-based project in Cambodia and is regarded as a minimum for the project to achieve its physical outputs during the project period *and* at established technical standards and quality.

The prices indicated in the above table relate to purchase of new equipment. However, Project CMB/92/008 already possesses some equipment which should also be made available to the contractors at second hand prices. Some contractors also possess some equipment which is applicable for the road works, and this would also reduce the investment costs.

Repayment Schedule

It is expected that a labour-based contractor engaged on full road rehabilitation works including full gravelling will be able to produce 1.5 km of completed work per month. If the contractor chooses to invest in a complete new set of equipment, the monthly expenditure during the first year of his investment would be as follows:

Repayment of principal over 2 years	US\$	2,666
Interest payment at 15%		800
Laterite ²		6,658
Monthly wage bill (skilled and unskilled labour)		6,800
Fuel, spare parts and miscellaneous		800
Repayment of principal and interest during the 2 months of the rainy season with no works		693
Total	US\$	18,417
Average cost per km (excluding profits)	US\$	12,278

2 Laterite costs 0.1345 per km and cum => 1.1 x 0.2 x 5 x 1500 x 0.1345 x 30 = 6,658 US\$/month (1.5 km)

According to available data in Cambodia, the average direct costs of full rehabilitation of one kilometre gravel-surfaced road at current standards³ is US\$ 10,000:- (1995 prices, excluding costs for depreciation of equipment).

The choice of contractors proposed for training has been based on the amount of road works envisaged to be carried out in this project ensuring that the contractors are given the best work opportunities, fully utilising their capacity after successful training. If six of the eight trained contractors are awarded all road rehabilitation works under this project⁴, each of the firms will carry out 150 km/6 firms = 25 km. With a progress of 1.5 km per month, each of the contractors will then have sufficient work during $25/1.5 = 16.7$ months. To this is added the void monsoon periods of 2 months each year.

With the above proposed repayment terms, the contractors will be able to repay $16.7/20 = 83.5\%$ of their equipment loans through contracts awarded by this project. If one estimates that a complete set of new equipment has an economic life time of 2 years, assuming a continuous use during 20 work-months, this will result in a residual value of the equipment at 16.5% after completing all road rehabilitation works at the end of the project. In other words, a major part of the equipment will be repaid by the end of the project. It should also be noted that it is expected that these firms will continue to carry out public works contracts after the project period.

With the above cost breakdown the equipment cost is 27% of total construction costs. This is comparable to other projects where labour-based work methods are used for rural road works under similar conditions.

If repayment was extended over 3 years the above costs would reduce to US\$ 17,300 and 11,533 respectively.

Total Costs of Works

Adding the costs of culvert and bridge works and allowing the contracting firms 10% profits, the total road rehabilitation cost per kilometre amounts to:

Costs of Road Works	US\$	12,278
Bridges and culverts		1,425
- 1 bridge per 4 km at US\$ 2,500:-		
- 2 culverts per km at US\$ 400:-		
<u>Sub-total</u>		<u>13,703</u>
Profits		1,370
Total	US\$	15,073

The above figures are only indicative. The identification of the road works still remains to be carried out by the project. Only then, can detailed field surveys be carried out, which will determine the exact costs of the various types of works.

Final Remarks

It should be acknowledged that a private contractor is a private business concern and therefore its development must be allowed to follow that of a business entity. It should also be noted that the hire-purchase solution is not a new concept developed for Cambodia. These equipment related issues have been raised in several labour-based small-scale contractor development projects, and experience has shown that the preferred solution by the contractors, and the most sustainable solution, has been to hand

3 Average embankment height = 0.7 m, 5 m carriage width with 0.2 m laterite surface

4 The remaining two contractors will be awarded periodic maintenance contracts

the ownership and full responsibility for the equipment over to the contractors. As a reference, the small-scale contractors in Ghana acquired equipment for a total of US\$ 160,000:- to be paid back in four years, and in Sierra Leone US\$ 99,000:- over four years.

It also needs pointing out that the supply of laterite is likely to remain a sub-contracted activity and thus about 35% of the potential income for the contractor is already assigned elsewhere. The real turnover for contractors for 25 km (about 18 months) will be about US\$ 245,000 or about US\$ 163,000 per year.

1 Introduction

Before a training programme can be designed, it is important to identify the various actors involved in this project and their respective roles and responsibilities. Once the local institutions who will be involved have been identified, it is possible to make a detailed assessment of their current capacity and prepare a detailed training needs assessment which will form the basis for the training programme, thereby ensuring that each of the local organisations will fulfil its operational responsibilities as described elsewhere in this document.

A logical starting point is found in the project objectives related capacity building in the public and private sector at provincial level to carry out rural road construction and maintenance works. In this context, three major players have been identified:

- (i) The client, i.e. the owner/provider of the infrastructure - in the case of this project, the client has been identified as the Government represented by the provincial, commune and district authorities and representatives.
- (ii) The provincial technical departments providing engineering and management services.
- (iii) The private construction industry through local small-scale and petty contractors who will execute the works.

The three above mentioned players will be given the responsibility for carrying out four major activities:

- planning and estimating of works,
- supervision of works,
- execution of works, and
- certification and payment of works.

2 The Client

The roads identified for rehabilitation and maintenance to be funded by UNCDF are all secondary and tertiary roads. Secondary and tertiary roads constitute a part of the national road network, implying that the Client for the works will be the Government of Cambodia. In the case of this project, due to the proposed decentralised funding arrangements, the Client can be identified as the provincial government authorities.

In the case of road works funded by the UNCDF Local Development Fund, the Client may be identified as the Village, Commune or District Development Committees, depending on which body is commissioning the works.

An important role of the Client will be to prepare road network plans and priorities which include clear linkages to the existing road network showing the physical connections to the various classes of roads existing in the area which are in a passable condition.

Another important task of the Client will be to ensure timely payment of the contractors based on the recommendations of the Engineer. In the case of small-scale contractors relying on a large labour-force it will be vital for the success of the project that the contractors are paid regularly and on time. This implies that the Client will need efficient financial procedures which enable him to process payments for works in a regular and prompt manner.

3 Provincial Technical Departments

Although future LBAT road works will be carried out by the private sector, the provincial authorities will still be responsible for the management of the implementation. To ensure that the works progress to agreed technical standards and quality, the Government through its provincial departments will require a solid technical capacity for contracts preparation, management and supervision. Through the current ILO labour-based road works programme a considerable amount of technical capacity has been established within the PWDs in the Provinces where CAREERE is operating, through the secondment of staff.

It is therefore recommended that this project continues to focus initially on the PWDs in relation to technical capacity building in order to ensure a good start. Since very little technical capacity can be found outside the PWDs, the PWDs may be engaged to take care of the engineering aspects for road works also outside their direct responsibility i.e. tertiary and village access roads. For works on these roads it is expected that the PDRDs and local development committees will initially rely on the technical competence and services of the PWDs to plan, supervise and inspect works. This arrangement has already been established between PDRDs and PWDs. In addition, the PDRDs are currently seconding some staff to the PWDs for training as a first step to building up a technical capacity in the PDRDs. This project will encourage this process by involving PDRD technical staff in the training programme.

In relation to village access road works (LDF project), it is suggested that the Engineer role also is given to the PWDs. It is not expected that a capacity to manage and supervise road works carried out by private contractors will be established at village or communal level within the framework of this project.

It is also envisaged that the training of Government and contractors' staff will be carried out initially from within the PWD in Battambang. For this, the PWD will require competent and experienced staff to participate in the implementation of all aspects of the training programme. In the first stage, this will entail that the Public Works Department in Battambang will be running a 10 km full-scale demonstration site with two construction units where road rehabilitation works are carried out with a standard set of equipment, 150 casual workers and corresponding site supervisory staff, for each unit.

The PWD staff requirements for taking care of the Clients interest when contracts are awarded to the contractors after the training phase are described in Figure 1. This organisation caters for the management and supervision of both road rehabilitation and maintenance contracts.

In order to strengthen provincial authorities capacity to manage road works using small-scale road contractors, it is proposed that a technical assistance team is recruited to develop further the contracts management system within the technical departments. The team should be working from within the sections of the Departments currently in charge of planning, construction and maintenance.

The team would consist of a Project Adviser, Training Adviser, Maintenance Adviser and three National Professional Engineers. The PA, TA and MA would be providing technical advisory support to the Departments in both Battambang and Banteay Meanchey. Two of the NPEs will mainly be supporting the implementation of works in one province each. During the initial training stages all project staff will be mainly concerned with the training activities.

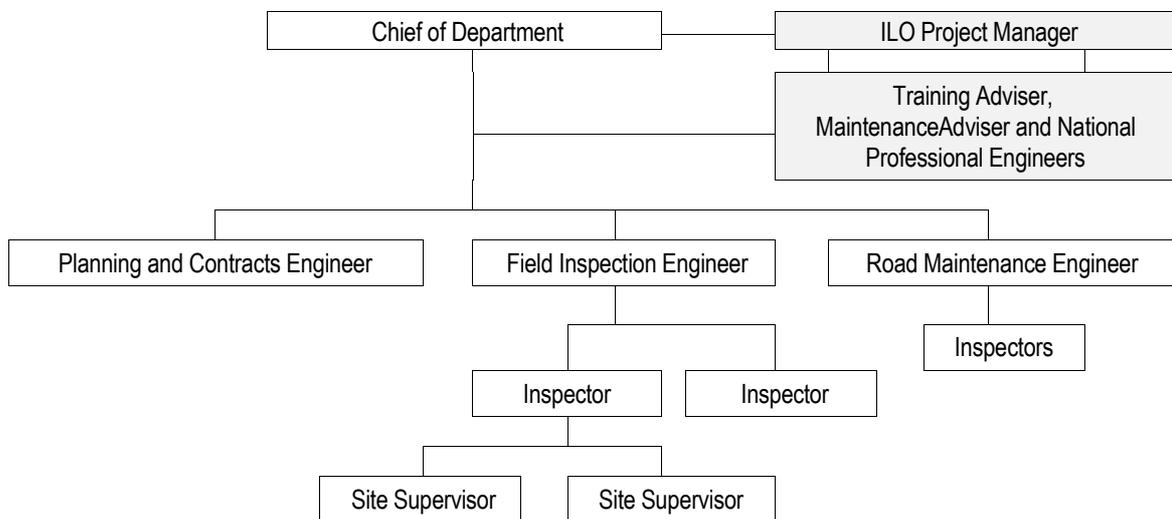


Figure 1 Organisation for DSR Contracts Management

4 Private Sector

The type of road works envisaged to be carried out can be grouped into two main categories according to the size of works, requiring contractors with two different profiles:

- (i) road rehabilitation contractors carrying out rehabilitation and periodic maintenance of secondary and tertiary roads, and
- (ii) petty contractors providing routine maintenance organised as a lengthman system.

4.1 Road Rehabilitation Contractors

Most domestic small-scale contractors are found in the building construction industry and the transport sector and are normally registered companies. Often limited, they still possess certain technical and managerial skills. However, experience shows that their organisation requires further training in business management, accounting, mechanical maintenance, road and concrete technology, as well as in labour-based work methods.

Their equipment fleet is sparse and often old and poorly standardised. Before they can be awarded road rehabilitation works, it is usually necessary to assist them in the acquisition of additional light construction equipment (i.e., hauling and compaction equipment).

The small-scale contractors are often under-financed and vulnerable to cash-flow distortions. Often, these contractors do not operate their accounts through a bank. In many cases the local banks do not consider these firms as attractive clients and therefore do not provide them any services. In the case of the local contractors in Pursat and Battambang, the private contracting firms do not utilise the services of the banks. One reason for this is that banking services have only recently been established in these areas and still needs more time to fully develop before the normal services of a bank can be provided.

After receiving appropriate training and development assistance, these contractors can prove to be highly efficient in carrying out both road construction and maintenance works. If they

possess a good entrepreneurial drive, and given favourable conditions for their operation, such as a steady supply of work and regular and timely payment, they will survive as sound construction firms and constitute an important component of the domestic construction industry.

It is proposed that the envisaged labour-based road rehabilitation contractors are equipped adequately to execute a monthly production of 1.5 km of rehabilitated gravelled roads to standards and quality already established in the labour-based road works programme. This would require an average labour-force of approximately 150 unskilled casual workers. In order to manage an operation of this magnitude, it is estimated that the firms will need the following management staff:

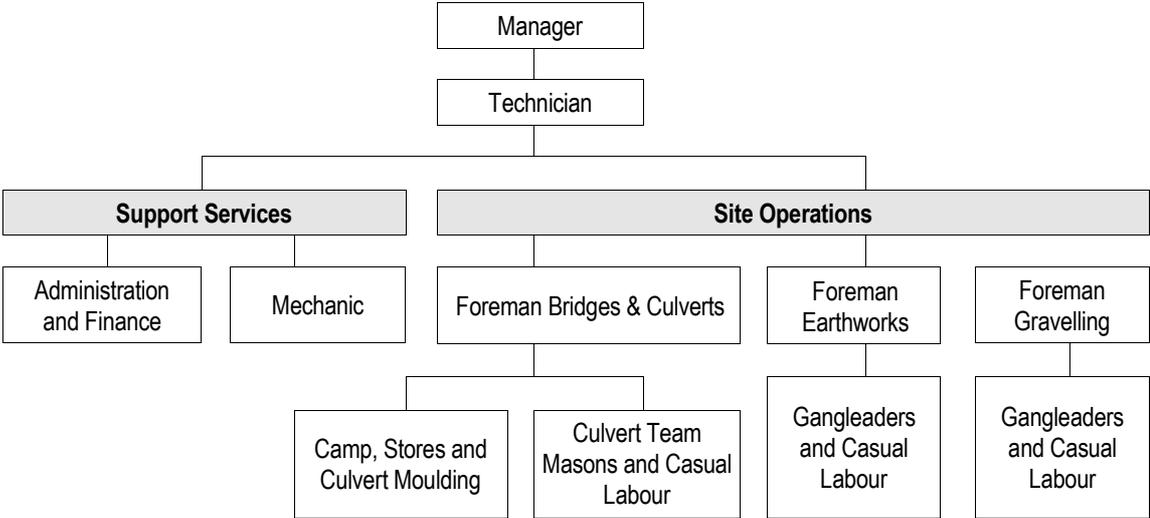


Figure 2 Organisation for a Road Rehabilitation Contractor

Each contractor should ideally possess the services of a graduate engineer in his management team for the overall technical supervision and management of contracts. This may be the contractor himself or a person employed by him. The on-site manager should at least be a person with a formal training to technician level. For the direct supervision of works, the contractor will need a minimum of three foremen. Furthermore, the contractors should be required to employ a qualified mechanic and book-keeper for his support services.

Figure 2 shows the minimum staff requirements which the contractors need to provide before they can qualify as a labour-based road rehabilitation contractor. If the firms wish to appoint staff with higher qualifications, this should be regarded as an advantage during the selection of the initial batch of contractors. It should be noted that the contracting firms selected to participate in the programme will be required to recruit this staff before commencement of the training programme since this staff will be part of the core target of the training.

4.2 Petty Contractors

The petty contractor is generally referred to as the one-man contractor. This category of contractors usually consists of one man firms, sometimes assisted by a limited number of unskilled workers. They may be labour contractors, usually consisting of a businessman sub-contracted to carry out specific work relying mainly on unskilled casual labour.

Organised local community groups such as farmers associations and village welfare groups can also be classified as petty contractors.

A common feature for this group is that they are not formally registered and do not possess any capital and are therefore extremely vulnerable to cash-flow problems such as mobilization capital and late payments. The petty contractors normally do not possess any equipment, and lack any means of transport. Due to their lack of mobility, they should be recruited from the vicinity of the project work sites.

These contractors are mainly used for maintenance works or simple, clearly defined sub-contracts requiring a minimum of skilled labour and equipment. In the current ILO labour-based road works programme, lengthmen have been engaged to secure the routine maintenance of reconstructed secondary and tertiary roads. In addition, such firms can be utilised for contracting out masonry works for small bridges and culverts.

5 Potential Contractors

During previous discussions, three possible options for contractor development have been identified. During the formulation mission, these options were further investigated through interviews with the various candidates (i.e. PWD engineers, technicians and supervisors, and local contracting firms). This section discusses the advantages and disadvantages relating to each of the three options which are finally summarised in Figure 3.

5.1 PWD Engineers and Technicians

Option 1

The first option, is to develop retrenched PWD staff into small-scale contractors. It appears that the PWD staff possess very little experience of the private sector and the financial and managerial aspects of running a private business firm. Most of them are still in the beginning of their professional careers and have acquired most of their working experience from Government service.

They are still employed by the Government, and they would be required to (i) terminate their current employment and (ii) establish their contracting organisation before they can effectively participate in a contractor development programme.

The strength of this group of candidates is that they have participated in the implementation of the ILO executed labour-based road rehabilitation and maintenance programme and therefore possess detailed hands-on experience in the use of labour-based road works technology.

However, before they could effectively operate as private contractors they would require:

- extensive training in business management and administration,
- support in equipment acquisition,
- support in establishing a operative company, both in terms of administrative and technical staff, office premises and equipment, etc,
- assistance in personnel recruitment and management,
- close assistance in establishing financial and administrative procedures for their firms,
- assistance in establishing site organisations (financial support, materials, equipment),
- financial support during the training and development period.

With reference to the previous Chapter, it should also be noted that the engineers and technicians, currently engaged in the labour-based programme, will also be required in a management role in a future organisation of the Departments despite the fact that the works will be executed by private contractors.

5.2 Small-scale Contractors

Option 2

The second option identified is to utilise existing domestic contractors and further develop these firms and train their staff to establish a private sector capacity to execute road works by labour-based methods.

During the mission, several contracting firms were contacted and interviewed. The contractors responded quickly and met with the mission team at very short notice. The general impression is that the local contracting industry in the two provinces is very much interested in this type of work, and based on their past experience and some additional training, they should be capable of undertaking the road works.

The interviews conducted during this assignment only covered a small portion of the potential contractors in the project area. It is still necessary to carry out a more complete survey of the sector in a more structured manner. One of the initial activities of this project will therefore be to carry out a comprehensive survey of the local private sector in the two provinces and detailed interviews the staff of the interested firms. The outputs of this activity will provide the basis for the final selection of contractors and design of the subsequent training programme to be provided by the project.

The main advantage of involving existing small-scale contractors is that this group can provide evidence of entrepreneurial skills through the works they are currently involved in. Although the major share of their operations is building works, they can provide a business entity, and an established organisation with administrative, financial and technical staff who could be further trained and developed to cater for the requirements of the labour-based road programme.

5.3 Contractors Employing Retrenched PWD Staff

Option 3

The last option is a combination of the above two. It involves the same category of contractors who would recruit experienced staff from PWD and the on-going ILO road works project. This alternative would provide all the benefits relating to both of the previous options and result in reduced training requirements (ref. Figure 3).

5.4 Recommendation

From the above it is therefore recommended that the Government selects already existing domestic contractors for training and development to execute road rehabilitation works using labour-based work methods. In order to further strengthen these contracting firms, they should be encouraged to recruit PWD site supervisory staff with labour-based works experience.

It is expected that this choice will enable the Departments to transfer their current force account operations to the private sector in the safest manner possible. Furthermore, this alternative will require the shortest training and development period, because emphasis is given to the full utilisation of the already existing experience and capacity of both the Department staff and the contracting firms.

Alternatives	Advantages	Disadvantages
1 PWD staff developed into contracting firms	<ul style="list-style-type: none"> ○ Possess solid experience in labour-based road works technology ○ Good experience in managing large numbers of labour 	<ul style="list-style-type: none"> ○ Require substantial training in business management and administration ○ Need to register and establish company ○ Require to recruit all administrative and site supervisory staff and develop an operating organisation ○ Does not possess any equipment ○ Poor knowledge of labour regulations in private sector ○ Unknown entrepreneurial skills
2 Existing contractors trained and developed to carry out labour-based road works	<ul style="list-style-type: none"> ○ Possess good experience in business management and administration ○ Contracting firms already established ○ Proven experience in contracts management ○ Possess the entrepreneurial drive ○ Possess some tools and equipment ○ Have means to and experience in establishing site camps ○ Good knowledge of labour regulations in private sector ○ Have established banking relations 	<ul style="list-style-type: none"> ○ Limited experience in road works ○ No experience in labour-based road works technology ○ Limited experience in managing large numbers of labour
3 Existing contractors employ retrenched PWD staff and provided supplementary training	<ul style="list-style-type: none"> ○ All the above advantages 	<ul style="list-style-type: none"> ○ Requires the recruitment of site supervisory staff with labour-based road works experience from PWDs and ILO

Figure 3 Alternatives for Privatisation

ASSESSMENT OF IMPLEMENTATION CAPACITIES OF THE LOCAL PROVINCIAL GOVERNMENT DEPARTMENTS

BATTAMBANG PROVINCE

1. Provincial Department of Public Works and Transport

The Provincial Department of Public Works and Transport (PDPWT) is a line department of the Ministry of PWT at the Provincial level and is a comparatively well organised, staffed and equipped department. The department is headed by the Director with a Vice-director. The department is responsible for the construction and maintenance of all public works (buildings, roads and municipal services i.e. sewerage treatment plant etc.) and road transport.

The department is organised into three functional divisions as under:

- (i) Administration and Personnel - this division also includes Transportation Section, Workshop facilities, Town Planning and building permits.
- (ii) Planning and Accounting - this division deals with payment of salaries and wages, stores procurement, accounting and planning.
- (iii) Technical Office - this division has five technical sections, each dealing with a specific functional area like the road section, bridges and culverts section, heavy equipment section, building construction section and municipal services section.

The department is responsible for the construction and maintenance of all the primary roads (national roads) and the secondary roads (provincial roads) in the province. The working parameters are:

- (i) Any work required to be done on the primary roads needs prior authorisation and fund allocation from the Ministry (MPWT) at the centre.
- (ii) Any work required to be done on the secondary roads needs necessary fund allocation to be received from the Ministry only.

This financial arrangement makes the PDPWT dependent on and accountable to the Ministry rather than to the Governor directly.

The Road Section has two construction teams and one road repair and maintenance team. The construction teams are further divided into one each for the laterite surface and bituminous surface works. The maintenance team has eight sub-teams each consisting of 6 workers (1-driver, 4-workers and 1 in charge foreman). All work is done through force account.

The PDPWT has a well organised Bridge Section under the Vice-Director. The total staff strength (all categories) with the PDPWT is 325.

No work is done through construction contracts. However, materials supply contracts (laterite, crushed rock etc) are signed centrally at the Ministry. As a result, the department staff has no experience in contract preparation, supervision of works and contract administration.

The PDPWT has two fleets of construction equipment - one mostly of Russian origin, which is obsolete and lying in unserviceable condition for want of spare parts which are not likely to be

available. These are beyond the stage of cannibalisation. All these equipment items eventually will have to be auctioned off as scrap. The other fleet consists of equipment items donated by the DCC, which are mostly in working and some in repairable condition. The PDPWT- DCC friendship workshop has reasonable repair equipment and other facilities. Availability of spare parts is an issue, for want of funds and foreign exchange. The department budget for 94-95 was approximately US\$ 200,000 including pay and allowances of staff.

The department has rehabilitated 25 km of roads in the western area of the province, on its own, (planned and implemented) using equipment and through force account.

The department today is also carrying out re-construction/rehabilitation of National Road # 5, part of the road length running in the Battambang Province, by use of mechanical equipment and through force account. The project is funded by the Asian Development Bank.

SMEC (Australia) is the consultant for construction supervision and providing technical assistance for project implementation. Presently, 48 staff (consisting of 1 engineer, 2 Technicians, and 43 other skilled workers) is employed on the project in training come force account works.

The NR # 5 is being rehabilitated to 9.0 m formation width (6.0 m carriageway + 2 x 1.5 m shoulders). The additional pavement thickness of 40 cm (25 cm of laterite sub-base + 15 cm well graded crushed aggregate base course) on the scarified and compacted existing road surface. The minimum total sub-base thickness required is 30 cm. A bituminous seal (two coat surface dressing, total thickness 2.5 cm) is also provided.

SMEC is working as Project Consultant to the PIU and is responsible for:

- (i) Monitoring expenditure (co-signature on all payments made).
- (ii) Works supervision, whether through contracts or force account.
- (iii) Contract administration (where done by contractors).
- (iv) Technical advice and assistance to PIU and work departments at site.

The work organisation and work culture in the PDPWT Battambang is thus equipment oriented, because all work is being and has been done with mechanical equipment and through force account.

1.1 Quality Control of Works

There is no material testing laboratory or other facilities with the department or in the province. The only soils and material testing laboratory in the country has been established at Phnom Penh, with French assistance. This laboratory is well equipped and fully functional under the directorship of Dr. Yit Bunna who is also the National Project Manager of the ADB funded primary roads rehabilitation program.

Laboratory technicians from the laboratory visit the field, carry out field tests or bring material samples for testing in the laboratory. Test results are informed to the Project Implementation Unit (PIU) and SMEC. This facility of site visits is only for the ADB project. Frequency of in-situ field density tests on the compacted soil subgrade and sub-base layers was reported by SMEC as one every 500 m. From the test results seen, it appears that good quality compaction is

being achieved.

SMEC is now actively considering establishing a small field laboratory at the project site, manned by a trained laboratory technician and one local counterpart.

Other institutions /organisations can send material samples (laterite, crushed aggregate or rock samples) for testing, before approval.

1.2 Danish Cambodia Construction

During 92 - 94, Danish Cambodia Construction (DCC) rehabilitated 130 km of roads (Secondary and Tertiary) with equipment from NCR and funded by CARERE. DCC worked closely with the DPWT also helping train the staff.

1.3 International Labour Organisation

ILO is the implementing agency of the UNDP project (CMB/92/008) for Rehabilitation and maintenance of roads in North Western Provinces of Pursat, BattamBang, Banteay Meanchey and Siem Riep.

In Battambang Province, though the technical assistance component of the project commenced in Nov 92, the physical rehabilitation works started in 93. To date, ILO has constructed / rehabilitated 126 km of roads in the province. These roads are constructed using LBAT by use of construction units organised for the purpose, through force account, except supply of laterite by sub-contractors.

Each construction unit consists of approximately 150 unskilled workers, 6 gang leaders (one per 25 labour), 3 - 4 supervisors, 1 technician and 1 local engineer per two units. This construction unit produces an output of nearly 1.5 km per month, approximately 15 km per year. The annual construction season is 9 - 10 months. At any one time, 4 roads are under construction/rehabilitation.

Since 1994, ILO also started maintenance of roads rehabilitated by it or by other agencies. Today, it is maintaining approximately 144 km roads in the province.

ILO expatriate field management/technical assistance consists of one technical advisor for two provinces, and one UNV for each province with necessary administrative and support staff.

The counterpart technical staff belongs to and is all drawn from the PDPWT. They number roughly:

1.	Engineers	2	5.	Store Keeper	3
2.	Technicians	4	6.	Accountants	2
3.	Supervisors	10-12	7.	Mechanics	4
4.	Operators	12-14	8.	Support staff	4

These local staff members have been trained by the ILO in use of LBAT in road construction and form an integral part of the force account units. They have been working with the ILO for the last 2 - 3 years, and are in a position to carry out their respective duties independently and help train others. This counterpart staff, during their tenure with ILO, receive incentive pay which secures sufficient staff motivation.

There are no site testing facilities at the ILO projects. It relies on pre-approval of quarry laterite samples and compacting effort / compaction results on judgement and experience. However, it is to the credit of the organisation and site staff that good quality work has been done under difficult site conditions. The roads constructed by the organisation have stood very well the recent unprecedented floods.

1.4 Capacity Assessment Summary

The department is best organised, staffed and equipped to carry out any road maintenance activities or rehabilitation works, by force account. But, the work organisation and work culture is equipment oriented. The staff has no or little experience in contract preparation, construction supervision and contract administration.

1.5 Capacity Building Requirements

The PDPWT in Battambang province, would need to be built up in skill level i.e. training of staff in planning, organising and supervising implementation of road rehabilitation and road maintenance activities by contract.

2.0 Provincial Department of Rural Development

The PDRD of Battambang Province was created last year, on formation of the new Ministry of Rural development (MRD).

The PDRD is the line department of the MRD at the provincial level. In its functioning it is closely involved with the PRDC, the Director PDRD is also the Vice-Chairman of the PRDC. It is organised at the provincial level on the lines of MRD i.e. 5 sections, each headed by a Deputy Director, representing a specific sector of rural development and concerned activities.

The PDRD at Battambang has a strength of 144 personnel of all categories including 18 women. 6 members on completion of training with MRD at Phnom Penh, it was stated, will be assigned to each of the districts (a total of 39) to man the district level offices of the MRD. Each of the four technical divisions has around 15 personnel at provincial headquarters and the fifth division of central/administration has 65 personnel.

The department is responsible for construction and maintenance of all tertiary roads in the province. The rural road responsibility is part of the Community Development Division.

This division is responsible for:

- (i) rural roads (tertiary roads)
- (ii) rural hydrology (tertiary canals, ponds etc.)
- (iii) community development

The technical staff of PDRD consist of a total of 7 persons (3 Engineers, 2 technicians and 2 field assistants). The Deputy Chief of the community development division is an engineer. This technical staff has received training in the use of LBAT on an ILO project earlier.

The total budget for the 1996, as prepared by the department is for US\$ 2,050,000, based on the 1996 yearly work plan. Out of this, US\$ 53,400 is recurring budget (fund allocation for which will be received from the MRD). This allocation only covers the cost of:

(i)	Salary and allowances of PDRD staff	US\$ 27,000
(ii)	Administration and furniture	25,000
(iii)	Internal support	1,400

The capital investment budget is estimated as US\$ 1,996,600, but the source of these funds is not yet identified. The yearly work plan prepared by the department is sent to MRD and PPD, for identifying possible donor agencies. The yearly work plan is also discussed with CARERE.

The rural road part of the 1996 work plan includes rehabilitation of approximately 34 km of tertiary roads at an estimated cost of \$ 160,000 plus 415 tonnes of food under WFP. There is no provision in the proposed yearly plan for any maintenance activities.

This complete lack of any firm financial allocation for capital investment (rehabilitation of existing roads) and maintenance activities, is a major impediment to long range development of departmental capacity.

Today, the department is not involved in carrying out any road maintenance activities or rehabilitation works. It has no equipment, no staff in the field and no system to execute, supervise, monitor and control construction activities.

The few available technical staff members in the department are used for costing of project proposals received from the DRDCs and preparation of annual plans, three year plans and the 1996 - 2000 five year plan for the PPD and MOP.

2.1 Capacity Assessment Summary

Today, the department is not involved in carrying out any actual road maintenance activities or rehabilitation works. As a result, it has no staff on field duties, no equipment and no system in place to organise and execute or supervise, monitor and control construction activities.

2.2 Capacity Building Requirements

The PDRD in Battambang Province, would need to be built up in staff strength and skill level, i.e. training of staff in planning, organising and supervising implementation of road rehabilitation and road maintenance activities, through contracts using LBAT. The necessary staff needs to be transferred from PDPWT, preferably some of those who have already been trained in LBAT by the ILO.

BANTEAY MEANCHEY PROVINCE

3.1 Provincial Department of Public Works and Transport

Banteay Meanchey is a former district of Battambang Province and was upgraded to a province only few years ago. Being a new province, its departments are not so well staffed and the staff is also not as experienced. The Provincial Department of Public Works and Transport (PDPWT) is a line department of the MPWT at the provincial level. The department is responsible for the construction and maintenance of all public works (buildings, roads and municipal services and road transport.

The total length of primary roads under PDPWT is 123 km, and the length of secondary roads is approximately 160 km.

The total staff numbers are 148, including 70 unskilled workers. The department has one engineer and 28 technicians (actually skilled workers is 15 mechanics / operators and 10 construction workers) - 2 or 3 are technicians/supervisors.

The present classification of technical staff in the departments gives an incorrect picture. The staff needs to be classified as under:

- Engineers (degree in Engineering)
- Supervisors/Inspectors (diploma in Engineering)
- Foreman
- Skilled worker/technician
- Operators of equipment

The portion of National Road No. 5 that passes through the province is under reconstruction / rehabilitation under the ADB funded project. This work is being done by an international contractor, supervised and managed by SMEC. There does not appear to be much involvement of the PDPWT at Sisophon in contract management, except as a member of the technical control team. The control team consists of the Director, one engineer each from Banteay Meanchey and Battambang provinces and an engineer from SMEC, who also is the work supervisor. The team functions are dual in nature, learning the processes and techniques of work and physical verification of the work completed.

The department has the following equipment:

motor grader	1
vibratory compactors	2
dump trucks (Russian)	3
water truck	1
dozer (Russian)	1

No road maintenance work is being done by the department on any of the secondary roads. Maintenance of only one secondary road (RP # 160) old 58, approximating 20 km and another 10 km portion yet to be numbered, thus totalling 30 km, would need to be done by the department. All other secondary roads in the province fall in the proposed repair and maintenance program of CARE, which is under implementation.

3.2 US Assistance for International Development (USAID)

Approximately 420 km of roads were rehabilitated in 1992 and 1993 in the two provinces of Banteay Meanchey and Siem Riep with USAID funding. Out of this, roughly 260 km is in Banteay Meanchey. Some of these roads are not approachable now for security reasons. All of these roads were rehabilitated to 6.0m road width, with 4.0m carriageway with laterite layer surfacing only.

These roads are in a variable condition of disrepair, depending on the quality of their original construction and the maintenance they received since their rehabilitation. Some of these roads were maintained by the PDPWT with DCC assistance. Two of the roads, with a total length 26.5 km, have been maintained by the ILO till Jun 95 (after which CARE has taken over) as under:

Chhouk road Route 587	(ILO Rd 45)	13.0 km
Phum Siem to Changha Route 588	(ILO Rd 44)	13.5 km

There is a plan now to repair and maintain most of the USAID rehabilitated roads (at least those which are accessible) approximating 240 km at an estimated cost of US\$ 851,160 by CARE funded by USAID starting October 95, though the majority of work would be done in the 96 dry season. The work is to be carried out through contracts in close cooperation with the PDPWT at Sisophon.

CARE has recommended that work should be done both through equipment based technology and labour based methods, as appropriate for each individual road. Equipment based repair and maintenance is more appropriate and has been recommended for major roads which travel through sparsely populated areas. The roads recommended for use of LBAT for work on are the two ILO maintained roads, road leading to the Tadong laterite pit and other two roads which under the present classification would be termed tertiary roads.

CARE has also pointed out the shortage of trained road engineers and technicians with the PDPWT, and has recommended that additional engineers and technicians need to be transferred from other provinces. The CARE programme would put severe demands on the PDPWT resources and capacity.

An interesting aspect of USAID program is the road pavement design. All these roads were rehabilitated in 1992 - 93 and are in need of rehabilitation again within a period of 2 - 3 years, at a considerable cost. Most of USAID rehabilitated roads are secondary roads. Laterite only road pavements have labour high maintenance costs when traffic levels increase.

3.3 International Labour Organisation Activities

ILO is the implementing agency of the UNDP project (CMB/92/008) for Rehabilitation and maintenance of roads in North Western Provinces of Pursat, Battambang, Banteay Meanchey and Siem Riep.

In the Banteay Meanchey province, CARERE has constructed / rehabilitated 168 km of roads. These roads were constructed in support of UNHCR during Nov 92 to Aug 93, to link areas marked for refugee returnees and to provide distribution points for food in the area. It also helped provide jobs to the communities concerned.

In end 93, the CARERE road program went to ILO for maintenance. In 1994, ILO spent only US\$ 78,000 on maintenance of these roads. Much progress on maintenance was not made due to the security situation, when all staff had to evacuate for 3-4 months. Though in 95, the security situation improved, but limited resources, (the existing project CMB/92/008 is scheduled to close on 31 Mar 96), and unprecedented floods have damaged the CARERE rehabilitated roads.

The ILO has today 142 km of roads under maintenance. The routine maintenance work is being done through the length man system along with WFP. However, emergency repairs (like flood damage) or special repairs are being done through the force account.

Only two roads are under construction / rehabilitation.

- Under construction is Tapho - Tadong (4.5 km) leading to the laterite quarry site.
- Under rehabilitation is Bat Drong road (9.3 km).

The work on these roads is being done using LBAT, by use of construction units organised for

the purpose, *through force account*, except supply of laterite by sub-contractors.

ILO expatriate field management /technical assistance organisation consists of one technical advisor for two provinces and one UNV for each of the province, with the necessary administrative and support staff recruited locally.

The national counterpart technical staff belongs to and is all drawn from the DPWT. They number roughly:

Engineers	1	Technicians	3
Supervisors	6	Operators	14
Mechanics	4	Support staff	2

These local staff members have been trained by the ILO in use of LBAT in road construction and form an integral part of the force account units. They are working with the ILO for the last 2 years, and are in a position to carry out their respective duties independently and help train others. This national staff during their tenure with ILO receive incentive pay.

3.4 Capacity Assessment Summary

Today, the department is not much involved in carrying out any actual road maintenance activities or rehabilitation works. The available staff would get closely involved in the CARE program. The existing capacity would need augmentation to cope with it. The staff today does not have experience to organise and execute or supervise and manage contracts for rehabilitation works, but by the time the CARE programme is completed, there would be some relevant exposure.

3.5 Capacity Building Requirements

The PDRD in Banteay Meanchey province, would need to be built up in staff strength and skill level i.e. training of staff in planning, organising and supervising implementation of road rehabilitation and road maintenance activities, through contracts using LBAT. The necessary staff needs to be transferred from other provinces or recruited directly.

4.0 Provincial Department of Rural Development

The PDRD of Banteay Meanchey province was created last year, on formation of new Ministry of Rural Development (MRD).

The PDRD is line department of the MRD at the provincial level. In its functioning it is closely involved with the PRDC, the Director PDRD is also the Vice-Chairman of the PRDC. It is organised at the provincial level on the lines of MRD.

The Director PDRD is a very dynamic and enthusiastic person, with a clear idea of what is to be achieved. However, resources are his biggest constraint. There is no technical person at all in the PDRD at Sisophon. It is hoped that some technical staff would be transferred from other provinces but low salaries and non-availability of residential accommodation is a major deterrent. Only practical possibility is new recruitment from the

The province has about 70 km of tertiary roads, which have mostly been constructed by CRC (Cambodia Red Cross) under Food for Work programmes. These access tracks do not have any cross drainage structures or laterite surfacing. These roads need to be rehabilitated.

There are no funds for the rehabilitation or maintenance of tertiary roads with the PDRD. This complete lack of any firm financial allocation for capital investment (rehabilitation of existing roads) and maintenance activities, is a major impediment to long range development of departmental capacity.

Today, the department is not involved in carrying out any actual road maintenance activities or rehabilitation works. It has no technical knowledge to plan and organize activities nor the equipment, and staff to execute or supervise, monitor and control construction activities.

The only possible source is transfer from the PDPWT. Proper and adequate staffing of the department should be a pre-requisite before commencement of any activities on tertiary roads.

4.1 Capacity Assessment Summary

Today, the department is not involved in carrying out any actual road maintenance activities or rehabilitation works. Hence, it has no staff in the field, equipment and no system in place to plan, organise, execute, supervise, monitor and control construction activities either through force account or contracts.

4.2 Capacity Building Requirements

The PDRD in Banteay Meanchey Province, would need to be built up in staff strength and skill level i.e. training of staff in organising, supervising and implementing road rehabilitation and road maintenance activities, through contracts. The necessary staff would need to be transferred from the PDPWT, those who have been trained in LBAT on ILO projects, or newly recruited.

DECENTRALISATION AND THE PARTICIPATORY PLANNING PROCESS AND SYSTEM AT PROVINCIAL LEVEL

1.0 Current Policy Context

The two key dimensions of decentralisation are those of political representation and control of financial resources. On both counts Cambodia appears highly centralised.

Political

The decentralised (provincial and lower level) political bodies associated with the former one party state have of course been suppressed, and the only elected legislative and policy making body is the national assembly. There is apparently some commitment to future political decentralisation with the possible creation of elected District and Municipal Councils.

Financial

Similarly, under current legislation (December 1993) all public revenue collection and expenditure has been centralised.

Revenue

Previously, the provincial administrations were allowed to retain a share of all tax revenues collected within the province - these now must be transferred to the central government.

Expenditure

Provincial departments' budgets for recurrent expenditure are determined by the National Assembly. Funds are transmitted to the provincial departments by the Ministry of Finance. These only transit through the Provincial Governors, who at least in theory are today allowed no discretionary powers to reallocate those as voted. The development budget is entirely disbursed by the central ministries.

It is expected that this central control will be relaxed once some degree of fiscal rigor and the mechanisms of financial control and reporting between the provinces and centre have been established. For the time being, only donor agencies are effectively placed under some kind of discretionary control.

1.1 Decentralisation in Cambodia.

The Royal Government of Cambodia (RGC) in 1994 took the initiative towards decentralisation by means of two major actions mentioned below:

1.2 Delegation of Authority

Under this initiative, the role of a Provincial Governor is not only to supervise the administration, law, order and security; but also to promote social and economic development including freedom and democracy in the province.

At the local level, it is proposed to hold local elections to the village committees and commune councils by 1996. The local elections would be completed about a year ahead of the general elections in the country to be held in 1998.

1.3 Decentralised Rural Development Structure (RDS)

Various elected committees at different levels of administration are designed to strengthen the

national and local structure for rural development and people participation. These structures are illustrated in brief as follows:

- At national level, the Council for Agriculture and Rural Development (CARD) was established, chaired by the Second Prime Minister and Ministers of all major ministries involved in rural development, and representatives of IOs and NGOs at the national level.

The major role of this council (CARD) is to formulate policies and guide lines for rural development and coordinate and guide rural development activities of the country, in which Ministries of Rural Development, Agriculture and Public Works are heavily involved.

- Also, the Ministry of Rural Development (MRD) was created to play the crucial role in co-ordinating and facilitating the rural development activities among partners involved.
- At the provincial level, the Provincial Rural Development Committees (PRDC) were created in December 1994 under the chairmanship of the Provincial Governor. The PRDC includes representatives of all the technical services in the provincial administration, with the Director of the Department of Rural Development (PDRD) as vice-chairman.
- At the district level, the District Development Committee (DDC) is formed under the leadership of the District Chief and consists of representatives of the provincial departments represented in the district and the Commune Heads.
- At the commune level, the Commune Rural Development Committee (CDC) is chaired by the Commune Head and in which the Community Development (CD) worker from the PDRD serves as the vice-chairperson. Other members comprise department representatives present at the commune level and all Chiefs of the VDCs.
- At the village level, the Village Development Committee (VDC) is selected by direct election among villagers. The number of members in the VDC varies according the number of families in the village.

MRD has stated that the formation of VDCs is part of national programme and strategy for decentralisation and rural development. The formation of development committees at various levels is based on representation, the main principle of the structure of the VDCs. As a result, these institutions are expected to play a key role in the decentralised and self reliant development.

The decision of the RGC to establish this RDS is a major step towards decentralisation and to facilitate rural development activities which are to be carried out by multi-sectors and agencies involved including international organisations (IOs) and non-governmental organisations (NGOs).

This new set-up of RDS has great potential to coordinate and facilitate rural development activities at the provincial and local levels. In addition, it has created an opportunity to channel funds to local communities, created a system of decentralised planning and a structure for implementation of these developmental plans.

Towards the establishment of the RDS, the RGC has targeted that by March 1998:

- all the 22 provinces will have a functional PRDC;
- 80 % of all districts will have a functional DDC;
- 50 % of all communes will have a functional CDC;
- 20 % of all villages will have a functional VDC.

The establishment of the RDS is the RGC policy which is being experimented in the four north-western provinces namely Banteay Meanchey, Battambang, Pursat and Siam Reap under close collaboration between the MRD and UNDP/CARERE.

The RDS was first piloted in Banteay Meanchey Province due to its strong organisational structure in terms of personnel and equipment supplemented by a long term experience gained in the past from various types of projects implemented. Banteay Meanchey Province is taking a lead in all activities in the formation and organisation of the RDS at various levels in the province. This success is no less due to the dynamic personality and commitment of the Director PDRD and very close and cordial relationship with the ADM of CARERE.

In Banteay Meanchey Province, the PRDC, 6 out of 7 of the DDCs, 21 out of 57 of the CDCs and 121 VDCs have been established.

In Battambang province, the PRDC, 8 DDCs and 32 VDCs have been set up. The formation of CDCs is reported now underway.

Major constraints that limit the speed of formation of the RDS, particularly of the VDCs and CDCs, encountered by the PDRD and CARERE staff relates to security reasons in many areas and the inadequacy of staff to simulate and facilitate the process.

2.0 Ministry of Rural Development

The Ministry of Rural Development (MRD) is a newly created (1994) ministry to coordinate and facilitate the development process in the kingdom. The official mandate of the Ministry states:

- Co-ordinating, co-operating, monitoring and evaluating rural development programs/projects to rehabilitate and develop the country's rural areas;
- Bring long term sustainable development in the rural areas to ensure that the people become self-sufficient and play a significant and participatory role in the economy of the country.

2.1 Development Strategies

To attain the above stated objectives, the following strategies would be adopted:

- The development activities will be oriented towards solving the socio-economic, cultural and security problems of the specific area according to the actual situation and needs of the people. The selection of target areas will be delegated to the provincial authorities, especially the Provincial Rural Development Committee (PRDC).
- Efforts will be made to improve the standards of living in all areas. Emphasis will be

given to integrating the efforts of government institutions, international agencies, private sectors and the general public; in order to solve fundamental problems of rural communities, through the use of appropriate technology.

- The role of people's organisation, especially the VDC and the general public in deciding how to solve their own problems and those of their communities will be encouraged, thus increasing self reliance.

The Ministry has proposed having line department at the provincial level (PDRD); a district office at the DDC and a Commune section at the CDC. However, only the PDRD have been established. There is no ministry representation at the district and commune level yet established.

At the Ministry, the General Department for Technical Affairs is divided into four departments:

- Department of Rural Water Supply.
- Department of Rural Health Care.
- Department of Community Development.
- Development of Rural Economic Development.

The construction/ rehabilitation and maintenance of rural roads forms part of Department of Community Development.

3.0 The Provincial Administration

The Governor, who is a staff member of the Ministry of Interior, is the chief of the provincial administration assisted by two or three vice-governors. All the main line agencies at the national level have department at the provincial level headed by the respective director. Like most other countries, the line agencies at the provincial level get their budget from the national level and their heads i.e. the directors are responsible to their superiors at the national level; but are also responsible to the governor for matters relating to their work in the province.

The Governor is responsible for co-ordination among the line agencies.

3.1 Provincial Rural Development Committee (PRDC)

To facilitate the co-ordination of rural development in the province, the Government has recently constituted the PRDCs, which are chaired by the Governor with the Director of PDRD acting as the deputy chairperson. The PRDC reports to the Ministry of Rural Development at the centre and through it to the CARD.

The PRDCs are a part of the rural development structure. PRDCs have already been established in both the provinces and it is understood from the MRD that all the institutions at the district, commune and village level would be established by mid 1998. These local institutions are intended to promote decentralised governance, 'bottoms-up' planning and community participation in developmental activities. Their constitution and functions are similar to local government institutions in other countries.

The major role of the PRDC is to manage the local participatory planning process i.e. identification and prioritisation of projects; and coordinate and manage the implementation of rural development plans for the province. This involves identification of the target areas, data collection and analysis, finalisation of project proposals and monitoring and evaluation of these

plans during their implementation.

The establishment of PRDCs is an important step and goes some way to fulfilling some vacuum left with the dissolution of the provincial councils and executive committees. But in the policy context described above, the co-ordination role of PRDCs is severely constrained in that they have little control over the line department resource allocations at the provincial level, except for some part of activities financed by the donors and NGOs operating within the province.

This is a major constraint and if decentralisation and grass-roots upward planning process is to take shape, then funds have to be made available to the Provincial Government to support the process of rural development and infrastructure rehabilitation.

There is no secretary and secretariat for the PDRC as yet.

3.2 Provincial Planning Department

There is a Provincial Department of Planning (PDP) which is the representative of the Ministry of Planning (MOP) at the national level. MOP is in the process of preparing a three year investment plan and a five year development plan and has requested the provinces to submit their plans for this purpose.

The department of planning (PDP) is reasonably staffed. However, only the Provincial Director of Planning has received any serious training in planning at the Ministry at Phnom-Penh. The training most of other staff have received is in sectoral planning and the planning officers at the provincial levels are in charge of sectoral planning only. No one has received any training in area planning and at present no such planning is attempted.

What constitutes the "provincial plan" is at present an aggregation of different line agencies' proposals and not an integrated plan with any specific objectives. These proposals are prepared by the line agencies and larger line agencies have a planning officer in the provincial department.

Because of lack of maintenance of infrastructure in the past two decades and the damage caused by neglect and civil strife, most of the work that needs to be done in the foreseeable future is rehabilitation. Therefore not much planning skill is needed to prepare these lists.

These are put together at the provincial level by the PDP which checks the plans for all the districts. At present this process is no more than consolidating the lists received. Although, there is some sort of screening, that is not based on any feasibility studies or project appraisals.

The criteria PDP reportedly uses are:

Do the project proposals conform with:

- general needs in the area ?
- existing facilities available in the area ?
- national policies ?
- provincial implementation strategies and priorities ?
- goals of provincial planning ?

The plan (project proposals) prepared by the PDP are forwarded to the MOP at the centre and to the PRDC. There is some ambiguity today in the functioning of PDP, its relationship and

responsibilities to the PRDC. It is not clear as to whether the plans prepared by the PDP need pre-approval from PRDC before its submission to the MOP. Today it does not appear to be the case.

3.3 Provincial Department of Rural Development (PDRD)

The PDRD is line department of the MRD at the provincial level. In its functioning it is closely involved with the PRDC, the Director PDRD is also the Vice-Chairman of the PRDC. It is organised at the provincial level on the lines of MRD i.e. 5 sections, each headed by a Deputy Director, representing a specific sector of development needs and activities.

The PDRD at Battambang has a strength of 144 personnel of all categories including 18 women. 6 members on completion of training with MRD, it was stated, will be assigned to each of the districts (a total of 39) as the District office of the MRD. Each of the 4 technical sections has around 15 personnel each at provincial headquarters and the central/administration accounting for 65 persons. The technical staff at the PDRD consisted of a total of 7 persons (3 Engineers, 2 technicians and 2 field assistants). This technical staff has received training in Labour Based Appropriate Technology on an earlier ILO project.

4.0 District Administration

The head of the district administration is the District Chief, who is also a staff member of the Ministry of Interior and reports to the Governor. Several of the main line agencies are also represented at the district level: i.e. agriculture (including hydrology/irrigation), education, health, planning, etc. The Department of Public Works is not represented at district level. Like at the provincial level, the District Chief is expected to coordinate the line agencies at the district level.

In some ways, the district administration is quite strong, as there are 70 - 80 government officers at the district level excluding teachers and medical personnel. However, considering that there are 100 - 150 villages in a district, and local roads are in a very poor condition and district officials have virtually no transport facilities, most line agencies at that level cannot service the village communities. Community development workers have recently been appointed in some of the districts. The only government officials below the district level are the commune and village chiefs, teachers and health officials.

The weakness in the district administration is not only in terms of numbers. Very few of the officers are trained and experienced and most of them have not received any training recently to upgrade their knowledge and skills. Most of the younger staff who has been appointed recently has little or no knowledge or experience specific to their functions. Under the agreement to share political power, political considerations seem to play a greater role in staff appointments than suitability for the work.

The government expects the district level to play a crucial role in the administration of rural development works. It is also the most realistic level to support the CRDCs and VDCs because at this level alone can it expect to have direct contact with these institutions. However, a major effort is necessary to strengthen its capacity if it is to play a meaningful role.

At district level, neither PDRD nor PDPWT has any organisation or staff and thus is in no position to play any positive role in the rehabilitation and maintenance of rural roads, at this level.

4.1 District Development Committee (DDC)

The DDC is expected to facilitate the co-ordination of rural development and manage the participatory planning process, in the district.

A major role of the DDC includes organising and co-ordinating information and project proposals, gathered and submitted by the CDCs, analysing the project proposals and prioritising them, managing and monitoring projects, making decisions on the distribution of available resources to the communes within the district and forwarding the project proposals to the PRDC for final approval.

District committees (nominated bodies) are functioning in the districts. The district committee of Sangke District in Battambang Province was visited by the Mission. The DDC is chaired by the Chief of the District and the representative of the PDRD is the vice-chairperson. Mr. Kong Yath, the deputy chief explained the process of preparation of the District Plan. He explained that 75 km of rural roads were included in the 1995 district plan for rehabilitation, but only 11 km has been rehabilitated so far.

On being questioned about the actual process of formulation of the District Plan, he stated that a workshop was called before preparation of the plan, in which village chiefs and commune chiefs took part. They identified and prioritised the roads to be rehabilitated or built. During the workshop all sector needs i.e. education, irrigation, roads, water supply, etc. were discussed. The workshop also prepared a five year plan. All chiefs of the line departments at district level also attend. They assist in the identification and prioritisation process with their detailed knowledge of the district.

However, there is no representative yet from the Department of Rural Development (PDRD) or the Department of Public Works (PDPWT) assigned to the district.

Each district (DDC) prepares such a plan and submits it to the province (PRDC). These plans are presently only compiled wish-lists, because the listed projects do not include any information as to the estimated cost of the proposed project, number of beneficiaries, anticipated benefits etc. Each department at provincial level, including PDRD is required to vet these proposed projects concerning their own areas of responsibility, sift and prioritise them and cost them. The finalised departmental lists are then forwarded to the Provincial Planning Department. PDRD forwards the plans to both to the PPD and the PRDC.

PDRD proposes to post five people in each of the districts, each one representing one area of rural development, such as community development (rural roads, minor irrigation, infrastructure and informal education), rural water supply, rural health care, rural economy and administration. When in place, these would be of great help in formulating, screening and costing the proposed projects. This staff is reported to be under training at the MRD.

Since no indication is given to the districts as to how much funds would be available, if any, nor is there any system of regular budget allocation, the planning process is only a listing of needs. The districts do not receive any funds and are not involved in implementation. All implementation is planned and controlled by the concerned department at the provincial level.

5.0 Commune Development Committees (CDCs)

Major roles of the CDC are gathering information and co-ordinating activities among the VDCs; identifying problems and needs of the commune, forwarding it to the DDC, planning

and monitoring activities, making decisions on the allocation of resources and reporting to the DDC.

No Commune Development Committee (CDC) or District Development Committee (DDC) has yet been formed in Battambang Province. Presently, nominated commune committees and district committees are functioning.

Though CDCs have been formed in Banteay Meanchey Province, the mission did not have a chance to visit and meet the CDC members.

However, considering that no budgetary (fund) allocation is today made at the CDC level, nor is there any trained staff available to screen, priorities, plan or implement; the CDCs are only compiling and forwarding the VDCs proposals to the DDCs.

6.0 Village Development Committees (VDCs)

The major roles of VDCs are to collect basic information needed at the village level which would enable VDC members to identify their problems and needs; and to take part in the participatory planning process; plan, design, implement, monitor and evaluate development projects undertaken in the village. The aim of establishing VDCs is to promote rural populace to take initiative in decision-making to solve their problems and plan for the needs of the community in the near future.

The establishment of these institutions in these provinces has been influenced by operation of the CARERE program, they were all in the target zone of CARERE..

CARERE had played an important role in training the CD workers of the PDRD who in turn played a key role in establishing the VDCs and training of VDC members on their role and functions. Such training has not been given to the CDC members or DDC members in both the provinces.

A village consists of approximately 100 - 200 families. The number of members on the committee is given in the PDRD guidelines, as under:

villages with families more than 150 9 members (5 male and 4 female)
villages with families lesser than 150 7 members (4 male and 3 female)

These committees are formed by direct election. Each head of the family votes. These elections are supervised by NGOs and the PRDC. The person who receives the maximum votes is elected as the Chief of the village committee. At least three pre-election meetings are held in the village to help explain the purpose and scope of the VDC and the election. During these meetings, those desirous of seeking election are identified. Earlier to these elections, the village chief was nominated by the government.

The village of Dak Sorsar with 163 families was visited by the mission. The election to the VDC were held on the 27 May, 95. The committee had nominated a secretary and a treasurer in addition to the chief. Other members all had some portfolio to look after like agriculture, road and canal repair, schools, etc. The VDC members had received two days of training by the PRDC.

The committee members explained that main purpose of the VDC was to develop villagers' effort towards fulfilling community needs and help identify and prioritise those needs. The

committee generally meets once a month, except when there is some urgent matter to be discussed. The VDC had identified its needs as road repair, irrigation canal repair, road to the dam site and food supplies.

The rationale for these demands was questioned by the Mission. The replies were clear and convincing. The returnee percentage in the village is high. They remained isolated in the beginning but slowly the process of integration sets in. Hence, the high priority for food and demand for Food for work program, since the returnees have not yet been able to establish themselves. There is no water in the dry season for the rice crop, hence high emphasis on the canal and roadwork.

The road rehabilitation now requested was initially constructed in 1961 and was in poor condition. It was rehabilitated in 1991 by USAID as part of the effort towards the resettlement of refugees. The returnees worked on the road rehabilitation project and were paid US\$ 2.0 per workday. Approximately 300 people worked for 2 - 3 weeks. The total length of the road is 3 km.

The road is again in poor condition due to lack of any maintenance during the last four years. On question as to why the villagers cannot maintain the access road leading to their village themselves, the committee members expressed that since the village has a high percentage of returnees and most people do not have enough to eat, the village cannot afford to provide any voluntary labour towards maintenance of rehabilitated roads. However, 400 to 500 workers would be available from the village and surrounding villages to work for food.

VDC decisions on works needed in the village and their priorities are forwarded to the CDC, both by a letter and personally by the village chief when he attends the CDC meeting. The VDC decisions are based on inputs from the villagers in informal discussions. The VDC proposals only give the list of works and without any cost estimates. Since there are no funds available with the VDC, nor is there any planning staff, they can only compile and forward these requests (wish lists) to the CDC.

However, in the final analysis the VDCs must be able to identify their infrastructure needs and prioritise them based on a participatory and rational process and prepare feasible proposals and suggest means to meet them in a sustainable manner.

7.0 The Planning Process

The primary function of the PRDC is to manage the local participatory planning process for the identification and prioritisation of development projects. The PDRD assists the PRDC in this.

At the PDRD, the DDCs Plans (project proposals) received from the districts are compiled, sifted, evaluated and cost estimated.

The screening of project proposals (DDCs forwarded lists) is done by the Deputy Chief of the section concerned with the technical assistance of the Engineer, as per worked out criteria and taking into account the implementation capacity of the department. The Section officers have detailed knowledge of the area (districts/ villages) and can ascertain whether the facility demanded is justified or not. The project proposals while being sifted are also rough cost estimated.

The Governor, as Chairman of the PRDC has also given guidelines for evaluation of the project proposals. These concern (i) Security, (ii) accessibility and (iii) economic potential of the area

selected for access.

Social criteria like nature and extent of existing facilities in the village or commune, number of beneficiaries, overall government objectives (like priority for IDP and refugee villages) for minimum facilities in each village/commune are also applied to prioritise the proposals. No economic criteria are yet applied.

Though these evaluation criteria have not been formalised and quantified in economic terms, these can be summarised as under:

- VDC formulation and projection
- Population involved i.e. beneficiaries
- Beneficiaries priority i.e. returnees, refugees, already settled
- Existing facilities nearby and their condition
- Implementation capacity
- Availability of other access and social factors
- Integration of communications

These criteria for selection, though objective, are today being applied subjectively for want of proper data and better tools and training. However, the credibility and relevance of the process cannot be ignored or minimised.

The evaluated list (the yearly provincial development plan) duly costed and prioritised is submitted to the PRDC for approval. The Governor exercises his personal knowledge before approving the plan. A copy of the plan is submitted to the PPD and MRD.

The provincial departments of planning and finance would have a say in the finalisation of the plan based on other sector priorities and budgetary constraints, but because there is no internal (provincial) revenue, and all the funding is from external donors only, these departments have no say.

Summary of the Planning Process

- i. Participatory planning process has commenced at the grass root level with the project identification and prioritisation at the VDC level.
- ii. The capacity to design, organise, implement and evaluate is not available at either village, commune or district level. Where line department district offices are available, this capacity would develop after financial systems are in place.
- iii. The PDPWT or PDRD do not have any district offices in any of the districts yet.
- iv. For lack of staff and budget, the CDCs and DDCs do not contribute much to the planning process except to compile and forward the "Need" list to the PRDC. The responsible attitude to participatory planning can only develop after these institutions are involved in implementation and budgetary control.
- v. PRDCs do not have an established secretariat, without which it really cannot perform its functions without assistance of line departments. As a result, line departments are acting both as planning organisation and implementation agency.
- vi. Really speaking, it is the PRDC which should be the "planning body" receiving proposals from DDCs, screening and prioritising them, allocating budget and monitoring their implementation, and subsequently evaluating their impact. The PDRD or other line departments should be the "implementing agencies" on behalf of PRDC.

Technical Assistance

- vii. Hence, any technical assistance towards strengthening the planning process has to focus at the PRDCs, as regards rural development and rural infrastructure is concerned.
- viii. But for want of a Secretariat and staff, this focus is not possible today. As a result, the actual planning process starts and ends today at the provincial line departments concerned and PDRD.
- ix. PDPWT and PDRD are the implementing agencies for Secondary and Tertiary roads respectively. These should be the focus of implementation capacity building; i.e. technical, managerial and administrative to design and manage road rehabilitation and maintenance works, through private contractors.
- x. In the context of this project, the capacity building should be concentrated in the PDRDs. PDRDs would be required to act both as planning and implementation agency for rural roads.
- xi. For the success of any technical assistance effort, it is essential that the requisite staff is made available for training. This should be a pre-requisite for project commencement, for training to be cost effective and subsequent smooth implementation of the project.

ROAD MAINTENANCE

1 Current Situation

There is practically no preventive road maintenance in Cambodia, nor is there any proper maintenance set up in the Provincial Department of Public Works and Transport (PDPWT) or the Provincial Department of Rural Development (PDRD) in the two provinces. The main reason for this situation is non allotment or receipt of funds for any type of maintenance activities from the central ministry. The only funds received by the Provincial departments are for salaries of its staff, which are at a very low level. As a result the roads keep deteriorating and the repair needs get more and more desperate. Even roads rehabilitated in the recent past have again deteriorated for want of regular maintenance.

Bilateral aid agencies like DCC and non Government organisations like CARE, Action Nord Sud were involved in maintenance of roads constructed or rehabilitated by these agencies themselves for some time. UNDP/ILO during the last two years has been maintaining the roads constructed and rehabilitated by it and other organisations. 144 Km in Battambang province and 142 Km in Banteay Meanchey Province, totalling 286 Km of roads are being maintained by I.L.O to day.

Routine maintenance is being done by lengthmen through individual contracts, and special repairs and periodic maintenance activities are done through force account, whenever and wherever required.

2 Maintenance Funding

As the rural roads are rehabilitated and re-constructed in the two provinces, the financial and technical support requirements for their adequate maintenance will also increase. The current budget for maintenance is non existent. There is no budgetary allocation from the Ministries to the Provincial departments for routine and preventive maintenance.

A whole new system needs to be established at the provincial departments of PWT and RD equipped with management, skill, staff, equipment and operating funds to carry out regular and effective maintenance of the rehabilitated assets. To develop such a system, and to make it operational on a sustained basis, will need time, training and most important adequate, regular and assured allocation of maintenance funding.

In the mean time, funds needed for maintenance of the rural roads already rehabilitated and continued maintenance of roads now rehabilitated under the project, needs to be included in the proposed project scope. This will ensure that the created assets are adequately preserved and serve the purpose that was meant to be served, both in terms of economic and social benefits; and the assets created are not allowed to deteriorate by default (lack of adequate maintenance).

3 Maintenance Responsibility and Needs

3.1 Secondary Roads

The responsibility for maintenance of Secondary roads is with the Ministry of Public Works and its line departments at the provincial level i.e. PDPWT. The province of Battambang has nearly 229 km and Banteay Meanchay nearly 160 km of secondary roads, totalling 389 km. Most of these road lengths need to be rehabilitated before these can be maintained at reasonable cost.

3.2 Tertiary Roads

The responsibility for construction and maintenance of all Tertiary roads has recently been transferred to the Ministry of Rural Development (MRD) and its line departments in the provinces i.e. PDRD (Provincial Department of Rural Development). These departments are still in the process of formation and staffing. Some technical staff has already been transferred (like in Battambang Province) from the MPWT and others, it is learnt would follow.

There are no proper records (road inventory) of tertiary roads available with the PDRD of the two provinces. In the absence of publicised design standards, all access tracks constructed (by villagers themselves, Cambodia Red Cross (CRC) with assistance from World Food Program under food for work scheme, and other NGOs) get classified as Tertiary roads. Due to lack of any compaction equipment and technical design and supervision inputs with these organisations; these constructed tracks are grossly deficient in the quality and standards required; but these would be expected to be maintained. In most cases these tracks are poorly compacted earthen embankments only, without any sub-base or surface. These would need to be upgraded to the requisite standards, before these can be maintained; otherwise their cost of maintenance would be very high.

4 Maintenance Strategy

The logical and often suggested strategy for maintenance of tertiary roads is to involve the beneficiary in the maintenance of assets. This should be the case because most of the tertiary roads lead to either a commune or a village. The officials at the MRD and PDRD accept the concept but are rightly reluctant to endorse it today.

Because, the economic condition of the populace in the two provinces is such (high percentage being refugee and IDP returnees who are in the process of settling) that voluntary labour input is out of the question at least for the time being (duration of this project). In any case it is not a sustainable solution and is not generally recommended.

It is also not practical to collect any road user fees nor does the vehicular traffic justify such a levy. It is unlikely that the vehicular traffic on Tertiary roads will ever reach a level in the foreseeable future as to warrant such a levy. Studies have shown that the cost of collection of tolls breaks even at the ADT of 250 - 300 vehicles only and to have any revenue the traffic required is of the order of 500 vehicles per day. The concept of road user fees is not applicable to tertiary (feeder) roads except indirectly through increased gasoline prices.

Hence, the total maintenance costs would need to be borne by the recurrent budgetary allocations catered for accordingly.

The traffic type and volume today, only requires a laterite surfaced tertiary roads. This situation is likely to continue for some years to come. Even after that, the pavement could be strengthened with provision of crushed rock aggregate layers. Routine maintenance of such roads can be more easily and effectively done through labour, using hand tools only, with use of making good material supply like laterite or aggregates as required.

This labour component would be fully paid (lengthman) under contract to the department. It could be initially partly voluntary and part payment (Food for Work programme) or fully voluntary with food aid as community participation over a period of time.

Recurrent and periodic maintenance would need to be organised under contract system, work to

be done by small-scale private contractors, and supervised and managed by staff of the Rural Roads Maintenance Section at the PDRD. The work involves activities such as reshaping of the road surface, regravelling and repair / reconstruction of damaged drainage structures.

4.1 Maintenance Management

Accordingly, at the PDRD a road Maintenance Section would need to be organised to carry out the following functions:

- ✓ Regular inspection of road sections and effective supervision of routine maintenance contracts (the Length man or participatory labour, their output and quality).
- ✓ Arrange procurement and supply of adequate quantities of repair materials, where and when required.
- ✓ Regular inspection (condition survey), maintenance planning, and immediate response to any emergency and unforeseen work requirements.
- ✓ Conduct of regular recurrent and periodic maintenance activities, necessary budgeting, funds allocation and financial management.
- ✓ Preparation of contract documents, bill of quantities and cost estimation, inviting bids and award of maintenance contracts.
- ✓ Construction supervision and management of contracts for recurrent and periodic maintenance works done through private small contractors.

The Maintenance Section would need to be organised and staffed accordingly. The staff concerned would need to be trained to organise, conduct, control and monitor the above stated maintenance works and activities accordingly.

4.2 Routine Maintenance

The vital routine maintenance tasks on rural roads are enumerated below:

- ✓ Repair, fill and compact pot holes and ruts;
- ✓ Reshape ruts and compact;
- ✓ Keep shoulders and slopes smooth, for ease of traffic movement and drainage;
- ✓ Cut grass and bushes;
- ✓ Keep side drains clear so as to allow free passage of water;
- ✓ Clear culverts and waterways for free flow of water;
- ✓ Maintain road signs in place;
- ✓ Perform minor repairs to culverts and retaining structures.

Routine maintenance of low traffic rural roads is a widely dispersed activity, requiring small resource input over a large number of widely separated points. This activity is best suited to manual labour. The amount of work needed to keep a length of road in good condition depends on several factors, such as type of road surface; traffic volume (number, type and size of vehicles); the severity of climatic conditions, especially rain fall; type of soil; the susceptibility of the terrain and road gradients to erosion; and the presence of bush and vegetation.

On an average, under average conditions, one full time labour should be able to do the routine maintenance works each year of 2 km of single lane earth or gravel road, with the traffic of

about 20 vehicles per day (which is the situation with the Tertiary roads). This activity can be most economically performed by persons living along the roads and engaged for road maintenance. Local workers are also under social pressure from their neighbours to do the job well. Former road construction workers are ideal maintenance workers, because they already have some training and experience in the work involved. In Cambodia the system is established for each lengthman to maintain 1 km of road by working 10 days in a month.

Daily supervision of a dispersed operation like road maintenance is feasible only if a supervisor is mobile. Hence, it is easier to enter into a contract with each maintenance worker. The contract should specify the stretch of road to be maintained, activities to be performed, the inspection and payment frequency and the payment. The payment must be linked with satisfactory completion of all the maintenance tasks involved. Labour only (petty) contractors will be developed to take responsibility for several lengthmen, thus reducing the administrative burden.

A responsible supervisor would need to be appointed to supervise the conduct of road maintenance works. His duties would be to instruct the contractors, to issue and account for tools and materials, to inspect all roads in his jurisdiction at regular intervals to ensure that maintenance works are done properly, to keep pay role and accounts, and pay the workers.

Each worker would need to be provided with the following tools:

- a shovel or hoe to repair the surface and clear the shoulders;
- a hand rammer for compaction of pot holes and ruts;
- a pick axe for excavation of soil or gravel for repairs;
- a scythe or dah for cutting of grass;
- a bush knife for bush cutting;
- a shovel for culvert cleaning;
- a file for sharpening tools;
- a wheel-barrow for hauling of gravel or selected fill material.

It would also be necessary to provide gravel, laterite or broken stones (as applicable) for filling potholes. This material should be stock piled along the road, every 500 meters or so, and should be replenished every 3 months or so as needed.

4.2.1 Routine Maintenance Costs

Labour Costs

In the proposed length man system, one worker (under contract) working for say 15 days in the months can take care of routine maintenance of one km of the rehabilitated road.

Length man (labour) cost per km	12 *15	\$ 180
Shared cost of a set of lengthman tools		\$ 20
Total		\$ 200

Supervision Cost

One Supervisor @ \$ 50 per month supervising 50 km of Tertiary road maintenance.

Cost per km per year	\$ 12
Cost of transport for the Supervisor	
Cost of Motor Cycle	\$ 2,000

Repair & Maintenance	\$ 1,000	
Total over 3 Years	\$ 3,000	
Charge per Km per year		\$ 20
Oil and lubricants @ \$ 2 per day		\$ 12
Total		\$ 32
Total immediate Supervision cost per km		\$ 44

Materials Cost

Cost of Laterite as routine repair material, 4 CM (including wastage) per km, at \$ 4.0 /cum at site	\$ 16
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Total Cost of Routine Maintenance **US\$ 260 per km per year**
(budget figure US\$300)

4.3 Recurrent Maintenance

The most important recurrent maintenance work required on low traffic volume, laterite surface roads in Cambodia, is reshaping and rolling at least once a year, particularly after the rainy season. Moisture adversely affects the shear strength of the laterite layer and movement of traffic during the rainy season (Aug - Oct) results in damage to camber, increased road roughness, potholes and rutting.

The extent of damage will depend on the intensity and duration of rainfall, and the time interval the road surface had to dry up, before movement of traffic. Traffic loading and number of heavy vehicles moving affect the outcome.

4.3.1 Cost of Recurrent Maintenance

Assuming that 25 % of the road surface needs reshaping and grading, the area to be reshaped works out as 1500 sm per km.

Labour work days required @ 25 SM per day	\$ 60
Compacting effort required - 2500 SM @ 200SM	\$ 12
Cost of equipment (one Roller - for half month)	\$ 150
Supervision cost (half supervisor for half month)	\$ 25
Fuel cost	\$ 20
Replacement of laterite (5 cm in affected area) CM 75	
Cost of material	\$ 365
Labour for spreading laterite	\$ 60
Total yearly cost per km recurrent maintenance	\$ 692

4.4 Cost of Periodic Maintenance

Laterite surfaced roads loses the laterite layer over a period of 3 - 5 years and need regular resurfacing. Regravelling is a major maintenance cost of gravel surface roads.

The cost of re-surfacing per km is indicated below:

Labour Costs

Levelling existing road	6,000	SM	50	120
Camber formation	6,000	SM	60	100
Spreading laterite in layers	12,000	SM	30	400
Watering laterite layers	12,000	SM	250	48
Compacting laterite layers	12,000	SM	200	60

Total Labour Cost per km US\$ 728

Material Costs

Average laterite quarry hauling distance	30 km
Laterite haulage cost per km per cum	0.125
Cost of Laterite delivered at site per cum	\$ 3.75
Quantity of laterite per km (20 cm)	1200 CM
Add for compaction (1.20) plus wastage at 5 %	300 CM
Total quantity required	1500 CM
Cost of Laterite per Km of road	\$ 5625

Total Material Cost per km US\$ 5625

Equipment Costs

Pedestrian rollers Sakai 700	1	\$12,000	12,000
Eaton Truck 2 tonnes	2	\$ 4,000	8,500
Water pumps	2	\$ 350	700
Water Bowser Tank 2000 litres	2	\$ 500	1,000
Motorcycles	2	\$ 2,000	4,000
Trailer	1	\$ 600	600

Total Equipment Costs US\$ 26,800

Equipment Usage Cost

Assume contractor life of equipment as 5 years.

Assessed (cost of servicing, maintenance and depreciation costs) 150 % of Equipment cost	\$ 40,200
Monthly payment at 12 % interest rate	\$ 900
Minimum anticipated output per month	1.0 Km
Equipment owning cost per km	\$ 900
Fuel costs per Km ...20 lts/day/\$0.40 per ltr	\$ 250

Equipment usage cost per km US\$ 1,150

Supervision Costs

Gang leaders	3	\$ 1.5	per day	113
Supervisors	1	\$ 100	per month	100
Technicians	1	\$ 150	per month	150
Engineer	1	\$ 200	per month	200
Operators	3	\$ 2.0	per day	150
Drivers	2	\$ 60	per month	120

Total Supervision Costs per km US\$ 833

Cost Summary per km Tertiary Road

Labour costs	\$ 728
Materials (Laterite) cost	\$5,625
Equipment costs	\$1,150
Supervision costs	\$ 833
Minor tools (2 sets)	\$ 200

Total contractor cost US\$8,536

Add contractors profit 10 % Contractors profit US\$ 854

Total Cost per km of Resurfacing US\$ 9,390

Assuming that the resurfacing is required every five years, then the yearly cost of periodic maintenance (resurfacing) works out to **US\$ 1950 per year per km.**

4.4 Total Maintenance Costs

Routine maintenance	US\$ 260
Recurrent maintenance	US\$ 692
Periodic maintenance (yearly)	US\$ 1,950
Total maintenance cost per km per year	US\$ 2,902 (say US\$ 3,000)

5 Existing Maintenance Organisation

Neither the PDRD nor PDPWT is organised, staffed, trained or has the necessary resources (LBAT needed equipment) and finances to carry out maintenance of roads, nor is maintenance being done. The only maintenance work being done is by the ILO.

The ILO trained staff though drawn from DPWT of the two provinces, still forms part of the ILO project implementation program. These when released, could form the core staff in the PDRD proposed road maintenance section. However, these personnel would need to be transferred to the MRD (PDRD) from the MPWT (PDPWT) against their demand.

This may appear a bleak situation but also provides an excellent opportunity to properly organise, train and staff the Maintenance Sections at the two PDRD, to carry out the future responsibilities of maintenance of all Tertiary roads in the Province concerned.

5.1 Suggested Maintenance Set-up

Any suggested Maintenance set up, for Rural Roads should be on the following lines:

- (i) PRDC ordinarily should be responsible for prioritisation planning, information systems and overall monitoring.
- (ii) PDRD should be responsible for general planning, procurement of services, supervision in the field, regular inspection and reporting (which is the basis of a maintenance system), and detailed monitoring of the maintenance activities.
- (iii) Private contractors (after their training and development) should handle the Routine and Periodic maintenance activities.

- (iv) Labour based lengthman system should be used through petty contractors for much of the routine maintenance activities.
- (v) For special (emergency) maintenance activities, force account maintenance system should be organised at PDRD, till the PDRD staff become fully conversant with contract administration and preparation of maintenance work order on an item rate contractor.
- (vi) Establishment of a suitable Maintenance Section at the PDRD, with a Provincial Road Engineer charged with the exclusive responsibility of maintenance of all tertiary roads in the province.
- (vii) Use of labour based methods for maintenance of rural roads is a must. It should be a means to encourage community participation in the petty contractor development.

The important thing is to get the preventive maintenance actually started on the ground as soon as rehabilitation works on a particular road section under the project are completed. Better system and skills can be developed gradually.

However, adequate financial resources would have to be provided to the PDRD exclusively for maintenance, to enable the Maintenance Section to be created, manned and developed. Such assured resources should cover as long a period (at least three years after completion of the project) as possible.

This is the rationale behind the suggestion (in the Project Costs) that the maintenance funding under the project should primarily cover the roads rehabilitated under the project for the longest possible time.

5.2 Maintenance Engineer

At each of the PDRD, a maintenance section headed by the Maintenance Engineer would need to be established. He would be responsible for maintenance management of all Tertiary roads in the province. He should be an engineer graduate trained in the road maintenance management functions and responsibilities. This training should form part of the project outputs.

His tasks and responsibilities would include:

- ✓ planning the annual program of maintenance works for the province, assessing the resources needed and preparing the appropriate budget estimate;
- ✓ arranging for fund allocation to different road works and prioritising them on need basis, if the funds available are not sufficient;
- ✓ authorising and scheduling work;
- ✓ overall supervision of the maintenance staff and ensuring that the staff concerned know their respective duties and carry out the work methodically and efficiently;
- ✓ monitoring the quality and effectiveness of maintenance activities;
- ✓ arranging training for his supervisors, inspectors and other maintenance staff.

For the Maintenance Engineer to carry out the above responsibilities, he needs to structure the various maintenance activities into a program of maintenance. For this purpose, certain tasks

need to be performed by him/his section:

- (i) Inventory: recording the list of roads and basic characteristics of each section of the road network.
- (ii) Inspection: examining the road section and measuring and recording its condition.
- (iii) Determination of maintenance requirements: analysing effects, their causes; and specifying what maintenance activities are needed to rectify them and delay any further deterioration.
- (iv) Resource estimation: costing the needed maintenance activities in order to define an overall budget.
- (v) Identification of priorities: deciding the work that has to take precedence if resources are limited.
- (vi) Work scheduling and implementation: timing and controlling the work implementation.
- (vii) Monitoring: checking the quality, its progress and effectiveness of the work.

However, regular, adequate and timely availability of funds is a prerequisite for the Maintenance Engineer and the Maintenance Cell to function. The project offers such an opportunity for organising, staffing and functioning of the cell. The process of budgeting and financial procedures and controls would need to be introduced.

5.3 Maintenance Section

To carry out all the above stipulated functions and responsibilities, the proposed maintenance section would also need to have the necessary other staff for:

- (i) Maintenance Supervisors - to check the work of the petty contractors, attend to his needs and ensure conduct of routine maintenance; regular inspection, checking and reporting on road condition for planning of other maintenance activities.
- (ii) Maintenance Supervisors - to check contractors' quality of work, its progress and assist in contract administration in the field.
- (iii) Contracts Engineer - to prepare cost estimates, contract documents and process award of contracts for special, recurrent and periodic maintenance activities.
- (iv) Finance Officer - to process all payments, keep proper accounts, process budgetary allocation and exercise financial control on behalf of the Maintenance Engineer.
- (v) Administrative staff - necessary administrative and support staff is allotted to the section for its efficient functioning.

The key to the management of maintenance activities is the competence of its technical staff to carry out the assigned duties. A number of competent work supervisors will be needed.

6.1 Training of Staff

Technical assistance would be needed in different areas both in order to:

- (i) Provide the selected staff with sufficient competence to carry out the functions expected from them in the maintenance set up.
- (ii) Assist the PDRD in the mean time in carrying out those functions and provide on job training.

For the training program to succeed, it is important to consider:

- Who are to be trained ?
- For what duties ?
- How many ?

Hence, identification and availability of requisite number of staff to be trained for designated functions must be insisted upon. Equipment required for conduct of practical part of training should also be arranged in advance.

The list of LBAT suitable equipment currently held by ILO in the two provinces is shown in Annex 12. This equipment is presently owned by the UNDP as part of CMB/92/008.

The project CMB/92/008 is scheduled for completion in Mar 96, but may be extended. The transition arrangement for the continued maintenance of roads (presently done by ILO) between now and commencement of maintenance activities under the proposed project CMB/96/CO1 has not yet been finalised.

However, equipment would be needed for training under UNDP co-financed technical assistance project, both for the construction of demonstration length and the trial lengths, by the small-scale contractor development programme.

Purchase of road rehabilitation equipment, using LBAT, under the proposed project is planned to be done for direct handing over to the trained contractors in a new condition, through ACLEDA. This equipment thus would not be available for training activities.

6.2 Training of Small Contractors

6.2.1 Technical Assistance

The "candidate contractors" will need assistance and training in matters relating to contracts and operational efficiency. This should cover the fundamentals of bidding and contract documentation, including specifications, measurement and methods of payment, estimating contract costs and pricing of bids, record keeping and cost control; planning, organising and site control; personnel and cash flow management. This training program should include on job training also to give the "candidate contractors" actual feel of construction contracting and work organisation.

6.2.2 Financial Assistance

Small contractors, particularly those undertaking contract work for the first time, need short term financing to meet the costs incurred prior to receiving any payment for the work executed. Such costs typically involve mobilisation, purchase of hand tools and survey equipment and advance payment for the materials. These outlays have a profound affect on the contractors' cash flow and liquidity.

Recourse to local banks for commercial credit to meet these short-term needs is futile, since small contractors have very little collateral to offer. In Cambodia, the only collateral acceptable was a house or land which again due to the prevailing security situation was valued initially low and then loan amounts were only 30 percent of the assessed value. Hence, improved payment provisions in the contracts becomes a necessity. These provisions can be advance for mobilisation and purchase of hardware and materials, prompt payment to contractors for works

executed, limitations on the amount of performance bonds and retention money.

Advance payment to small contractors should be carefully considered, since equipment and tools will be supplied under loan agreement and materials required are minimal. This advance should be recovered by deducting a predetermined percentage of the contractor's earnings after a initial grace period of two months. The repayment percentage should be set at such a level as to recover the whole of the advance within the contract period.

Prompt payment could be fostered by stipulating in the contract that the Client would be penalised for non payment to the contractor within a specified number of days of submission of monthly payment request. This penalty should be in the form of interest charges at the current commercial rates payable to the contractor, for any excess period. Other projects have made immediate payments to cover labour costs at the end of each month with the balance paid through the interim certificates.

Equipment advance should be through the ACLEDA, because the equipment repayment period may be beyond the project duration. However, this is a risk which has to be taken if small-scale contractor development is to be achieved.

TECHNICAL ASPECTS

1 Road Classification

The Cambodia Transport Rehabilitation Study (TRS) which had no brief for tertiary roads had proposed the following functional road classification for adoption and selection of road standards:

- Asian highways which link Asian capitals with each other and with major international ports.
- Primary roads which link the provincial centres to the capital and to the main border crossings.
- Secondary roads which link the District centres to the provincial centres and the primary roads, or which link centres of adjacent provinces; also roads which connect major industrial centres, tourist centres with large transport needs to the primary roads.
- Tertiary roads which cater for the intra-district transport needs or which link adjacent districts; also roads which connect rural centres to towns, to each other or to primary or secondary roads.

This road classification has been accepted by the Government and is under promulgation by MPWT to all the provincial departments.

MPWT was so far responsible for the construction and maintenance of all roads but with the creation of the Ministry of Rural Development, the construction / rehabilitation and maintenance of all tertiary roads has now been entrusted to this new Ministry.

Earlier, the provinces were responsible for the maintenance of the provincial and district roads (now secondary and tertiary roads) under their own local budgets, while central government paid for maintenance of the national roads (primary roads). With the recent change in the fiscal procedures, all road maintenance has to be financed from the central budget, but no budgetary allocations have ever been made since 1993.

The total length of primary and secondary roads is 7,800 km, of which about 2,500 km is of primary roads. Details of total existing tertiary roads in the provinces is not available.

2 Need for Road Standards

In the absence of any official road standards, different bilateral aid agencies and other NGOs have each followed its own standards of road rehabilitation. These agencies and consultants for the current rehabilitation works tend to use the standards they are most familiar with and from their home countries. This has created a basket of standards under use.

For example Tertiary roads rehabilitated by Action Nord Sud have a road width of 4.0m. Roads improved by ILO have a width of 5.0m, and those by DCC of 6.0m. The specifications followed for rehabilitation works are also different by each agency.

A uniform standard for all roads rehabilitation and improvement works is highly important and desirable and should be developed as a matter of policy and priority. The development of technical staff and progressing of rehabilitation works would be greatly facilitated if the road design standards are agreed and promulgated early. This is under consideration by the LBAT Task Force.

Cambodia would need to develop large number of road engineers for design, construction, construction supervision and maintenance management of its road net work. Standardisation of design and specifications would greatly help in the development process.

3 Design Standards

The selection of design standards is related to road function, volume of traffic and terrain. The design process as such deals with the following main steps:

- Establish road function;
- Assess the design traffic and its characteristics;
- Assess other factors which should affect the design (terrain, type of sub-grade, sub-grade strength, availability and cost of construction materials etc);
- Select geometric design standards (road cross-section, design speed and speed related standards);
- Select appropriate pavement design (total pavement thickness, thickness and type of materials for each component layer).

The selected design should be justified economically and the optimum choice varies with the construction and road user costs.

In Cambodia as elsewhere, any suggested standards must be based on economic and technical considerations. The total rehabilitation needs are huge. Hence, functional standards are recommended. These can always be revised upwards as the traffic increases and more funds become available, in a stage construction process.

The capacity for planning, design, construction and supervision is also a major constraint today and will remain so in the foreseeable future, since the total resources are limited.

4 Design Traffic

TRS has proposed that the design traffic volume should be defined as the average daily traffic (excluding motor cycles) in 5 years, after the road has been rehabilitated (i.e. including generated traffic).

There have been few systematic traffic studies done in Cambodia since the 1960. Traffic counts at some forty different sites on primary roads were undertaken by MPWT in 1993, in connection with a Japanese study. The counts covered one day only at each site. Current traffic volumes are obviously affected by the existing poor road conditions, as well as by the security problem.

Few road sections outside the urban areas, including national highways, have traffic volumes of more than 1000 vehicles per day. The average for all national roads is some 500 vehicles.

4.1 Secondary Roads

No traffic study data was available for secondary roads, but depending on the location an average daily traffic varying between 50 and 200 vehicles per day is likely to be the range on the secondary roads. Actual figures are important since at above 120-150 vpd, low-cost bituminous surfacing needs to be considered.

4.2 Tertiary Roads

Traffic surveys were done by the ILO on two tertiary roads in 1995. One on road Charp Krasang - Kahach Poy between 21.3.95 to 27.3.95 during construction and between 06.7.95 and 12.7.95 after rehabilitation. The other was on road Odambang - Psar Thmei between 16.1.95 to 22.1.95 before rehabilitation and between 23.5.95 to 29.9.95 immediately after rehabilitation. Each of the surveys was conducted over a period of a week. The results of these surveys are attached as Annex 12. It is seen that there is sharp increase in the traffic as a result of road rehabilitation, indicating that the roads were generally impassable to motorised traffic beforehand.

Based on the surveys and the fact that these are mostly commune and inter-district roads, an ADT of not more than 50 vehicles per day for the tertiary road is considered reasonable.

4.3 Other Factors

Rural roads are low cost, low traffic volume roads meant to provide all-weather access between centres of population and main road network. Pedestrians, animal drawn carts, bicycles, bicycle-rickshaw and animals etc are important components of the traffic mix. Trucks, motor cars and motorcycles (with motor trays) represent the largest proportion of the motorised traffic. As a result, there is less need for high speed and high geometric standards road, but it is more appropriate to provide sufficient width to allow their use by slow moving traffic.

5 Proposed Geometric Standards

The geometric design standards cover road width (cross-section), horizontal and vertical alignments and provide the requisite link between the cost of building the road and the costs of the road users.

The aim of geometric design standards is to establish:

- road space for vehicle movements;
- adequate site distances;
- consistency of alignment;
- framework for economic design.

The principle considerations are road safety, traffic levels and the terrain. Hence the adopted design standards must take into account:

- environmental road conditions;
- traffic characteristics;
- driver behaviour.

Six basic road types termed A - F were proposed by TRS based on road function, design class, and road cross-section (carriageway width and shoulder widths). These are reported to have been accepted by MPWT.

The design speed affecting the standards for vertical and horizontal curvature is not generally relevant in Cambodia where most roads are level and relatively straight. The type of road and the design speeds recommended for different road classes are shown in the Table I below.

Because of the extensive rice cultivation (needing constant water), most roads require

embankments on long sections in order to enable adequate drainage. A minimum embankment height of 0.7 meters above the constant water level is recommended.

ROAD CLASSIFICATION AND SUGGESTED DESIGN STANDARDS IN TRS

DESIGN CLASS	A	B	C	D	E	F
TYPE OF ROAD	Asian Highway	Primary Roads		Secondary Roads	Tertiary Roads	
Width of carriageway, m	7.0	7.0	6.0	5.5	3.0	3.0
Width of shoulders, m	2 * 3	2 * 1.5	2 * 1.5	2 * 1.5	2 * 1.5	P.P
Total road width, m	13.0	10.0	9.0	8.5	6.0	3.0 +
Surface	Bitumen	Bitumen	Bitumen	B alt G	B alt G	Gravel
Maximum gradient %	8	8	10	10	15	20
Design Speed km/h						
Mountainous terrain	85	70	60	50	40	-
Rolling terrain	100	85	70	60	50	-
Flat terrain	120	100	85	70	60	-

NOTE: The above suggested functional road classification and design standards for different classes of roads was reported by MPWT as having been accepted, but the Ministry of Rural Development did not appear to be aware of it because they agreed with the need for standardisation of tertiary roads design elements. Since the TRS had no brief for tertiary roads a more considered policy should come from the LBAT Task Force.

5.1 Secondary Roads

Type D road is suggested in TRS.

Cross- section:	
Carriage way width	5.5 meters
Shoulders width	2 * 1.5 meters
Total road width	8.5 meters
Road surface	Gravel
Maximum vertical gradient	10 %
Design Speed (km/hour)	
Flat terrain	70
rolling terrain	60

This is a higher standard than is normally recommended internationally for roads with less than 100 vpd (gravel surface only). Here the more authoritative Overseas Road Note 6 (TRL) recommends Class E total road width 6.0 metres.

It is not recommended that the project deals with secondary roads where bituminous surfacing is a consideration (i.e. above about 120-150 vpd). Hence overall 6.0 metres will be adequate.

5.2 Tertiary Roads

Type E road is recommended by TRS and this would no doubt be considered by the Task Force.

Cross-section	
Carriageway width	3.0 meters
Shoulders	2 * 1.5
Total road width	6.0 meters
Road surface	gravel (laterite)
Shoulders	laterite
Camber	6 %
Design speeds (km/hour)	
Maximum gradient	15 %
Flat terrain	60
Rolling terrain	50

All roads rehabilitated by ILO have a total road width of 5.0m with paved shoulders. This road width is considered adequate for the low traffic levels and no adverse criticism was voiced. It is an important consideration that most of the tertiary roads in Cambodia will need to be constructed on an embankment, which is a constraint to future widening but traffic levels would have to increase out of proportion to trigger that situation. Typical cross-sections produced by PDRD in Battambang show 4.0m width for village roads and 4.5m for commune roads. The current ILO standard exceeds these and is recommended as adequate for less than 50 vpd.

6 Right of Way

Presently, private construction was seen to extend right up to the shoulders and some times encroaching on them too, for the roads to be rehabilitated. This, in addition to being a traffic hazard, also impedes the free flow of water to the nearby culvert.

The right of way is defined as the physical extent of right of access that is granted in association with a road. It is essential for provision of special facilities, borrow areas, reserve for future widening of the road width and proper drainage. It is recommended to be accepted and promulgated for all roads to be rehabilitated and necessary land rights acquired. Cambodia has legislation for right of way but it is currently inoperative.

Pavement Design for Project Roads

Gravel surfacing is considered fully adequate for the volume of traffic presently using and anticipated in the near future, and bituminous paving is not usually justified, till the traffic increases beyond 150 vehicles per day.

The method according to TRL Overseas Road Note 31 is for bituminous surfaced road pavement design and makes only passing references to gravel roads. This method is easy to use and has been adopted in most of the countries with climates similar to that of Cambodia. Suitable constructions are recommended as a function of the desired life length (in ESA) of the pavement, the strength of the existing soil sub-grade, and the type and strength of the materials used for pavement layers.

Though the Road Note deals exclusively with bitumen roads, but thin bituminous layer like surface dressing does not significantly add to the strength of the pavement, and acts as water proofing layer only and improves the riding qualities of the road surface. However the increase

in cost is significant and stronger pavements are recommended to ensure uniform performance and riding quality. This is not such an important consideration for gravel surfaces which can easily be reshaped.

The pavement design is presented as thickness values of the specified material component layers in the pavement.

7.1 Design Assumptions

Soaked CBR value of the compacted soil sub-grade	4 %*
Soaked CBR value of the compacted (laterite) sub-base	40 %
CBR value for crushed rock (aggregate) granular base material	80 %
Design life of the pavement	10 years

* *with roads constructed on well compacted and protected embankment and sealed with laterite surface the subgrade will not operate under soaked conditions and higher values 8-10% can be taken.*

7.2 Pavement Design for Secondary Roads

Assumed design life of pavement	10 years
Traffic loading during design life (ESA) only around 300,000 assuming 50% trucks (at 2 ESA)	

This is only at the basic minimum even over 10 years and ORN 31 charts showing pavement thickness of 275 mm (Class S4) would be over designed, for the immediate years. 200 mm of laterite on subgrade will be adequate until traffic levels require the addition of a granular layer and bituminous surfacing.

There was conflicting information regarding the loaded trucks using the Secondary roads per day. The Director of DPWT at Battambang indicated an ADT of 200-250 vehicles per day during the Agricultural and harvesting seasons. However, this figure could not be confirmed from any other source, but such roads would require bituminous surfacing from the start. They are not recommended for the project.

7.2.1 Recommended Design

For higher traffic levels a total pavement thickness of 30 cm, against 35 cm required, could be recommended. The surface layer consisting of 10 cm (compacted) crushed aggregate (against 15 cm required) over a laterite sub-base of 20 cm (compacted) in two layers. This design thickness could be adopted as an interim measure. The traffic loading requires a pavement layer of CBR 80 % or above, to avoid excessive maintenance costs.

The crushed aggregate surface layer would not however be a satisfactory surfacing without a bituminous seal (since it has no binder material) and would need renewal frequently depending on the generated traffic, after which period strengthening measures would be incorporated to full design thickness of 15 cm crushed aggregate layer at the time of surface renewal. This is not a recommended option.

Gravel roads are cost effective in most areas of Cambodia at very low traffic volume, but due account needs to be taken of high cost of laterite and higher periodic maintenance requirements. As the traffic on secondary roads increase to an ADT of 150 vehicles per day, bituminous surfacing would need to be considered. Regular traffic counts are essential to judge the

economic point of constructing a bituminous surface on a full pavement thickness. In the absence of reliable figures a 200 mm compacted gravel surfacing is a justifiable recommendation, initially with staged improvement corresponding to traffic increases.

7.3 Pavement Design for Tertiary Roads

At around 10-15 trucks (say 2 ESA) per day traffic levels pavement design criteria do not apply and experience and cost become the guidelines, and construction quality becomes paramount. 150mm of good quality, compacted laterite on uniformly compacted sub-grade embankments, and with adequate camber (8%) have proved adequate world wide over long periods.

Not much data about the traffic is available. However, results of one week traffic surveys conducted on two roads just before and after these roads were rehabilitated, are included as Annex 12. It will be seen that most of the traffic today is cycles, motorcycles and rickshaws. Vehicular traffic i.e. trucks, which contribute to the traffic loading are few. Hence, minimum design parameters can be used.

Action Nord Sud has adopted 20 cm of select material (laterite) with 10 cm of crushed rock aggregate (4-6 cm) with 15-25 cm rock edging to contain the pavement layers. This specific design was seen to have stood very well, particularly during the rainy season. However, per Km cost of this pavement is reported as \$ 14,000 (without overheads) for a total road width of 4.0 M. They were constructed purposely as minimum maintenance roads.

Since, development of traffic on these Tertiary roads will be slow, (and is closely linked with development of the area as a whole) and most of the traffic imposes very low loading (being motorcycles and cycles) and cost is a major consideration.

Further, locally available select material (Laterite) well compacted offers a very stable and reasonably smooth riding surface most of the year, except in the 2-3 rainy months of Aug - Oct. During this period, any movement of heavy vehicles will cause rutting, resulting in water stagnation and damage to the pavement. This damage would need to be made good in the form of reshaping and compacting the top laterite layer every year.

Also, the laterite surface will disappear and will need to be re-surfaced every 3-5 years, depending on the extent of loss of laterite and surface reshaping requirements.

7.3.1 Recommended Design

Pavement thickness of 20 cm (compacted) of select material only (Laterite compacted in two layers) is recommended for the tertiary roads, for this project. This laterite only pavement would need renewal after a period of 3-4 years at which point, further strengthening, depending on the generated traffic and volume of truck traffic can be considered, to its full design value of 30 cm thickness.

ROAD REHABILITATION

8 Strategies for Road Rehabilitation

The development of a rehabilitation program for the road network in the Provinces covered under the Project has to consider three main aspects, apart from financial and other constraints.

- which specific road should be rehabilitated first i.e. serving which functions and which

- areas.
- what level of rehabilitation should be undertaken, ranging from emergency repairs to a full reconstruction.
 - what technical methods should be used for the rehabilitation.

These three issues are discussed below:

8.1 Priority for Rehabilitation

In the context of the prevailing situation in Cambodia, and this project, (where only secondary and tertiary roads are planned for rehabilitation), three considerations need major attention:

- (i) The roads selected are less affected by the security problems, to provide relatively safe environment for work and subsequent usage of the facility.
- (ii) The roads selected should integrate into the existing (rehabilitated or under rehabilitation) net work for maximum benefit to the existing and the generating traffic. The network should move out like the palm and the fingers.
- (iii) The roads selected should be assessed according to pre-established social and economic criteria.

8.2 Levels of Rehabilitation

The term 'rehabilitation' has a range of meaning from emergency repairs to a full restoration of original or higher standards. The guiding element is the extent to which deterioration, basic defects and initial design deficiencies can and need to be corrected, minimising the total cost of road rehabilitation and cost of its usage (to traffic) over the design life. The higher road usage cost is accepted to keep rehabilitation costs within acceptable limits.

The cost of rehabilitation work depends on the current road conditions and how best these can be improved to provide the basic facility, appropriate to the anticipated traffic and safety. The supply of construction materials like Laterite and -crushed rock within reasonable haulage distances and their relative costs at the site, also dictate the level of rehabilitation.

The rehabilitation activities would consist of:

- raising the existing embankment to sufficient height and reshaping it,
- correcting any major drainage failures to ensure future proper drainage and
- providing a road pavement sufficient to carry the existing and anticipated traffic.

8.3 Criteria for Evaluation and Prioritisation

The evaluation of individual road sections considered should answer the two basic criteria:

8.3.1 Criteria for Economic Justification

Provided that the project does not lead to any unacceptable social, environmental or other ill effects, the proposed project is considered justified if it results in an acceptable rate of return on the investment. The minimum rate of return is same for all investments, in order to ensure an optimum resource allocation (opportunity cost of capital). Commercial rate is generally applied, which is accepted minimum of 12%.

Investment models are available to carry out the economic analysis.

The benefits normally considered in an economic evaluation are:

- Direct savings in the cost of operating vehicles,
- Economies in road maintenance costs,
- Time savings by travellers and freight,
- Reductions in road accidents (these often increase on improved roads),
- Wider effects on the economic development of the region.

Investment models are also available to estimate the total transport costs associated with different road surfaces including vehicle operating costs, maintenance costs and renewal costs under a variety of traffic, climatic and maintenance conditions.

Rural roads however represent the grass roots of the road network which feed traffic into the Secondary roads linking rural areas to the main network. The rural roads (tertiary) are short in length, have low traffic volumes, are generally constructed with gravel surfaces. For these roads the economic justification for the investment rests mainly on the expected impact on the rural and agricultural development. Both these outputs are time related and have a greater element of uncertainty.

The extent to which the local economy adjacent to the proposed road will benefit from the investment is dependent on its economic potential such as unused land, irrigation facilities and labour, transportation facilities and costs. The forecast increase in agricultural production, producer surplus and assessment of resultant producer benefits is a complex and difficult task.

This effect on the economy is extremely complex and virtually impossible to model, and any assessment made has a high element of uncertainty.

8.3.2 Social Criteria

Social benefits could be large in numbers and of different types, all directly or indirectly related to improved accessibility and reduced transport costs, including the value of time saved.

The following are amongst the criteria that may be used for ranking rural roads rehabilitation program:

- **Present condition of the road.** Communities without any access should be given highest priority. The better the existing access, the lower the priority.
- **The availability of access year - round.** Communities without access during some parts of the year should have higher priority.
- **The area influenced by the road.** The larger the area of influence, higher the priority. The correct determination of the area served is important but is difficult. The limits of the area are generally provided by watersheds, rivers or the proximity of adjacent roads. In the situation of rural roads in Cambodia, the area within walking distance of two hours from the proposed road can be taken.
- **The inhabitants served.** The greater the number of inhabitants to be served, the higher the priority.
- **Present transportation costs per km.** The road transport costs are related to the road condition. The higher the present costs, more these costs will decrease by road improvements. Data is unlikely to be available.
- **The area of cultivable land within the area of influence.** A rural road program should benefit as many small farmers as possible. Roads leading to fewer farms and

houses should be given low priority.

- **Increased area of cultivable land.** By improving access, the inhabitants get encouraged to cultivate more land within the area of influence of the road.
- **Orientation of local produce to the market.** The greater the volume of marketable produce, higher should be the priority for road improvement.
- **The potential increase in marketable production.** Increased production is related to road conditions, because improved access to markets will encourage the inhabitants to produce more goods to sell.
- **The availability of social and economic services.** Most of the social and economic services (medical, educational, and agricultural inputs) end where the road ends and go no further. Improved access makes these services available to isolated communities.

Each of the above social criteria may be assigned a point range say from 1 - 5 points. When all criteria have been given weighted or unweighted points, these points are summed up to determine the relative priority of each proposed road.

This priority list is the first step towards preparation of a program of work and should be continuously reviewed as other possible roads are identified. However, a certain volume of data needs to be collected before points can be correctly allocated.

8.4 Criteria for Ranking

The economic and social criteria would result in two different rankings of the same proposed road. The reconciliation of these two rankings into a single list of priorities, depends on what weight is given to social versus economic benefits.

In the context of rural road rehabilitation in Cambodia, the social benefits should have far greater weight than the economic benefits. There are a number of reasons for this contention, which are enumerated hereunder:

- Economic criteria evaluation requires considerable and detailed data on traffic (volume and composition of current and future traffic); vehicles and operating costs; transport costs, and user characteristics; road conditions and information about agricultural produce. In the absence of such a data (which is the case in Cambodia - and the two provinces involved), analysis would per force be carried out based on such assumptions.
- Errors in these assumptions will produce large errors in the estimated economic rate of return, and can be misleading.
- In the context of decentralised governance and planning, identification and prioritisation of rural road rehabilitation proposals are expected to be made at village, commune and district levels. To expect an economic analysis to be done at any of these levels would be unrealistic. The only level where some data collection and an economic analysis can be attempted is the provincial level. This will require training of concerned staff at the PDRD in both functions, which will take time to be implemented.
- Social criteria are easy to apply and are also more easily understood by all. Their application can be done even at the commune level and has an image of fairness.
- Social benefits are more apparent and appealing than economic benefits which are hidden and indirect. In the current political and security situation in Cambodia, social benefits must have an over riding priority over economic benefits , for greater mass appeal.

8.5 Rehabilitation Prioritisation System Recommended

The identification and prioritisation of road rehabilitation program in the project, is mandated to be done by the two provincial governments through the decentralised rural development structure (RDS) at the level of PRDC. The PRDC is a committee with 12-13 members (each head of the line department at the provincial level is a member, in addition ADM CARERE and other NGO and women organisation representative are members) with no secretariat. A smaller executive committee is some time appointed by the Governor.

Hence, the work of relevant data collection, preliminary cost estimation of the proposals received from the DRDCs, application of selection criteria, analysis, acceptance and prioritisation of project proposals would be done at the PDRD. The recommended projects and priority list along with budget estimates is then put up to the PRDC for review and approval.

For the above process to happen, a rural road rehabilitation planning cell would need to be established where the above stated functions can be performed. The cell would need to be manned by suitable and qualified personnel. The personnel would need to be trained in the process of project planning, programming, budgeting and control.

The establishment of this section in the two provincial PDRDs and training of its staff would form an integral part of the technical assistance training programme under the project.

CONSTRUCTION EQUIPMENT AND COSTS

Carriageway width	3.00 m
Shoulder width	2 * 1.00 each
Total road width	5.00 m
Pavement (Laterite) thickness	20 cm compacted
Embankment restoration (height)	0.70 m average
Embankment slopes	1 : 2

PER KM COST**Labour Costs**

Survey and Setting out	1000	M	250	4
Clearing & Grubbing	8500	SM	500	17
Earthwork	5600	CM	2,5	2240
Levelling in 4 layers	22800	SM	100	228
Watering of layers	22800	SM	300	76
Side slope formation	2000	M	40	50
Turfing side slopes	2000	M	20	100
Excavating side drains	2000	M	40	50
Compaction of earthwork	22800	SM	500	45
Camber formation	5000	SM	100	50
Spreading laterite 2 layers	10000	SM	50	200
Watering laterite layers	10000	SM	300	33
Compacting laterite layers	10000	SM	500	20

Total Labour Cost per km $3113 \times 1.5 = 4,670$

Material Costs

Average Laterite quarry haul distance	30 km
Laterite haulage cost	0.125/cum/km
Cost of Laterite delivered at site	\$ 3.60/cum
Quantity of laterite per km (20 cm)	1,000 cum
Add for compaction (10% plus wastage at 5%)	120 cum
Total quantity required	1,120 cum
Cost of Laterite per km of road	\$ 4,032
Total Material Cost	\$ 4,032

Culvert Construction Costs

One single row construction 1.0 m	\$ 600
One double row construction 1.0 m	\$1,000
	\$1,600

Equipment Costs

Pedestrian rollers 950	2	\$13,000	26,000
Etean with bowser/pump	1	\$16,000	16,000
Pick-up 1x2	1	\$16,000	16,000
Handtools	1	\$ 4,000	4,000
Motorcycles	1	\$ 1,500	1,500
Miscellaneous items	1	\$ 500	500
Total Equipment Costs			\$64,000

Assume contractor life of Equipment as 3 years. \$1,778 per month
 Assessed (cost of maintenance during 3 years) \$ 360

Monthly payment at 15 % interest rate	\$ 267
Minimum anticipated output per month	1.3 km
Equipment owning cost per km	\$ 1,850
Fuel costs per km 20 ltr/day/\$0.40 per ltr	\$ 400
Equipment usage cost per km	\$ 2,250

Supervision Costs

Gang leaders	6	\$ 1.5	per day	\$ 225
Supervisors	2	\$ 50	per month	\$ 100
Technicians	1	\$ 150	per month	\$ 100
Engineer	1	\$ 100	per month	\$ 100
Operators	5	\$ 2.0	per day	\$ 250
Drivers	2	\$ 50	per month	\$ 100
Total Supervision Costs per km				\$ 875/1.2 = \$ 730

Cost Summary per km Tertiary Road

Labour costs	\$ 4,670
Materials (laterite) cost	\$ 4,032
Culverts costs	\$ 1,600
Equipment costs	\$ 2,250
Supervision costs	\$ 730
Minor tools (2 sets)	\$ 200
Total contractor cost	\$13,482
Add contractors profit 10 %	
Contractors profit	\$ 1,348
Total Per km Cost	\$14,830

A budget figure of \$15000 has been generally used.

For minimum standard secondary roads - total width 6.0 metres labour and material costs increase approximately pro rata and the total cost per km becomes : \$16,750.

Item Description	Cost US\$
Pedestrian Vibrating Roller Sakai HV 400 S	7,000
Pedestrian Vibrating Roller Sakai HV 700 S	12,000
Riding Roller Vibratory, Sakai 1.2 Ton	22,000
Eatan Diesel Standard, pay load 2 Ton, 12 HP	4,500
Eatan Light Truck, 706N with Diesel engine	4,000
Dump Truck	13,000
Water Tanker Eatan, C/W 5000 ltrs	4,000
Water Bowser Tank, capacity 2000 ltrs	500
Water Pump Honda FG 2000, 5.5 HP	350
Concrete Mixer CEQ 6, with diesel engine	1,200
Dump Truck with Trailer 2 wheel C/W	12,600
Internal Concrete Vibrator	200
Vibratory Plate compactor, Honda GX 240	1,000

PRODUCTIVITY NORMS (TASK WORK) FOR ROAD CONSTRUCTION

Description of Work	Unit	Task Rate
Survey and setting out	m	40 – 50
Clearing and grubbing	m ²	25 – 75
Levelling existing ground	m	5 – 10
Side ditch	m	5
Filling embankment in layers		
(a) Transport upto 10 m	m ³	2.0
(b) Transport more than 10 m	m ³	1.5
Side slope for embankment	m	20
Forming camber over subgrade	m	2.5
Turfing of road side slopes		
(a) No transportation	m ²	25 – 30
(b) With transportation	m ²	10 – 20
Excavation for culverts	m ³	2
Spreading of laterite	m ²	25
Watering	m ²	200 - 250
Compaction	m ²	200 - 250

wd - workdays (successfully completed one task).

TRAFFIC COUNT RESULTS

ON ROAD CHRAP KRASANG - KCHACH POY (TERTIARY)

BEFORE AND AFTER REHABILITATION

Mode of Traffic	Total Traffic (weekly) before	Average Daily before	Total Traffic (weekly) after	Average Daily after
Pedestrians	868	124	1175	168
Bicycles	992	142	3029	433
Motorbikes	847	121	3160	451
Motor trays	34	5	271	39
Ox-carts	124	18	93	13
Motor cars	48	7	192	27
Trucks	2	0	73	10
TOTAL	2915	416	7993	1141

Note: Increase in traffic as a result of road rehabilitation is very significant in showing that the road was impassable to most motorised transport beforehand.

However, for design purposes, it is only trucks that are significant and at ADT of 10 at present only the basic provision of a 150mm compacted laterite surface would be adequate.

TRAFFIC SURVEY RESULTS ON ROAD NUMBER 13A (TERTIARY)

ON 15 - 21.3.93 AND 04. - 10.10.93 AND 19 - 25.1.94

Mode of Traffic	Average Daily Traffic before	Average Daily after	Average Daily (Weekly count) after in Jan 94
Pedestrians	38	57	39
Bicycles	36	97	305
Motor Bikes	29	112	402
Motor Trays	10	18	39
Ox - Carts	16	17	15
Cars	4	21	24
Trucks	2	7	13
TOTAL	135	329	837

NOTE: Increase in traffic as a result of road rehabilitation is very significant in showing that the roads were impassable to most motorised traffic beforehand.

ADT for trucks indicates that only the basic road standard is required.

TRAFFIC SURVEY RESULTS ON ROAD CHARP KRASANG - KCHACH POY (TERTIARY)

BEFORE AND AFTER REHABILITATION

Mode of Traffic	Total Traffic Before	Average Daily Before	Total Traffic after	Average Daily after
Pedestrians	868	124	1175	168
Bicycles	992	142	3029	433
Motorbikes	847	121	3160	451
Motor Trays	34	5	271	39
Ox - Carts	124	18	93	13
Motor Cars	48	7	192	27
Trucks	2	0	73	10
TOTAL	2915	416	7993	1141