



ASIST

ADVISORY SUPPORT INFORMATION SERVICES AND TRAINING FOR LABOUR BASED PRACTITIONERS

A Programme executed by the Employment-Intensive Investment Branch (EMP/INVEST) of the ILO

Asist Bulletin no. 6, September 1997

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EDITORIAL

The current and next bulletin are dedicated to helping alleviate some of the existing problems of equipment on labour-based roadworks programmes. This is being achieved through a collaborative effort between ASIST and the MART (Management of Appropriate Road Technology) research programme.

Tools and equipment will also be the topic of the Sixth Regional Seminar for Labour-based Practitioners, which will be hosted by the Ministry of Works, Transport, and Communications in Uganda, from 29 September to 3 October 1997. More information is given in the Bulletin, and the outcome of the seminar will be reported in the next issue. Tools and equipment was identified as the most important topic for discussion during the Fifth Regional Seminar.

The centrefold of the bulletin illustrates a costing model for equipment, which may help you in budgeting and choosing the right tools for the job. One of these choices, the choice for haulage equipment, is worked out in an article. Other articles present advice on selecting and choosing the right tools (handtools and templates), new labour-based equipment (stone crusher), and new challenges (rehabilitation bitumen roads).

The bulletin also provides news, project information, a diary, and an article describing a programme on rural transport in Zimbabwe. The rural transport and accessibility component of ASIST will feature more and more in the bulletin, to provide a holistic approach in improving access, since "roads are not enough".

We are further happy to inform you that ASIST phase III started in July 1997, and will bring us to the middle of the year 2000. In ASIST III, our mandate has been widened to include all labour-based programmes, especially rural roads, urban infrastructure, and rural transport and accessibility. We look forward to continuing to work with you in promoting efficient labour-based methods to construct and maintain infrastructure!

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THE WORK OF ASIST WHAT

ASIST is a broadly based programme of advisory services, information dissemination and training. It was established for the support of construction and maintenance of rural and urban infrastructure works in Sub-Saharan Africa, using labour-based methods.

With the ultimate aim of promoting employment creation and income generation, ASIST provides the following services from a small team of 12 specialists, based in Harare and Nairobi, who work closely with a network of leading international consultants in the field of labour-based technology and rural transport.

Advisory Support

Provides policy advice, technical, organisational and managerial support to labour-based infrastructure projects and programmes in liaison with the Southern Africa Multi-Disciplinary Advisory Team (SAMAT) in Harare, Zimbabwe, and the East African Multi-Disciplinary Advisory Team (EAMAT) in Addis Ababa.

Information Services

Gathers and synthesises general and specific information on labour-based technology and related fields for dissemination to practitioners and other interested persons. Provides a technical enquiry service to respond to specific requests for information. Maintains a network database of contact persons.

Training

Develops and implements international training courses for engineers, senior technicians and trainers in collaboration with the Ministry of Public Works and Housing, Kisii Training Centre, Kenya. Assists in setting up courses in national educational and training institutions.

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Equipping for success

By Rob Petts, Principal, Intech Associates, Consulting Engineers

All labour-based road programmes rely to some extent on simple equipment and tools. Despite years of experience, there is still ample scope for improvement in the financing, design, selection, specification, procurement and management of this important supporting resource, so that our key local resource, labour, can perform more cost-effectively. This continuous improvement is essential for labour-based technologies to remain cost-effective and viable. Only then will labour-based technology be able to create sustainable productive employment.

The Management of Appropriate Road Technology (MART) initiative has been investigating the needs of the intermediate equipment sub-sector through questionnaires to users on ILO projects in developing countries. Furthermore, a workshop in Accra in 1996, organised jointly by MART and ASIST, identified and enumerated the needs of the sector in more detail. These requirements are summarised in the following box:

Intermediate equipment Sub-sector needs:

- Awareness creation for engineers, contractors and manufactures
- Cost-awareness regarding all equipment (& particularly intermediate equipment)
- Designs and specifications for procurement
- Procurement guidelines
- Management and support guidelines
- Training in management, support and operation
- Availability of finance
- Availability for hire
- Dissemination of information

The investigations have shown that there is still a need for widespread enlightenment regarding the range and capability of intermediate equipment, including tractor applications. Furthermore, there is a prevailing lack of knowledge regarding the real and up-to-date costs of owning and operating any type of equipment, be it sophisticated or simple.

There is a need to highlight the real costs of financing and ownership, which are neglected in many equipment management systems, and which can dwarf operating costs in a high cost finance environment; thus possibly adversely affecting management decisions on choice of technology or

equipment.

There are potentially considerable benefits to be gained from encouraging the establishment of local plant-hire companies providing intermediate equipment. This would further assist small local contractors in reducing their capital or borrowing requirements so that they would use and pay for specific equipment items only when they have secured work contracts. Contractors could also be encouraged to hire out serviceable-but-idle equipment to other contractors.

Better understanding of the capabilities, flexibility, actual costs and advantages of intermediate equipment is necessary, particularly by the engineers, contractors and equipment suppliers. Where necessary, contract procedures and documentation need to be adapted to accommodate the use of local labour-based contractors and appropriate equipment.

There is also a need for better understanding of equipment needs outside the feeder-road sector. Bitumen roads and concrete surfaced roads, as well as other rural and urban infrastructure, can be maintained with low-cost equipment.

Through the articles in this bulletin, it is intended that some of the constraints listed in the box on page 1 will be addressed, particularly leading to greater awareness about intermediate equipment. The pull-out centre spread will be the first of a number on equipment costing which, it is hoped, will clearly demonstrate the extremely high cost of lowly utilised (and especially sophisticated) equipment in most developing country situations. More importantly it should help client's and contractor's engineers to appreciate the full range and extent of the various equipment cost components.

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Rehabilitating bitumen roads with intermediate equipment

Old techniques - new challenge

By Steven St. John, Colas UK Ltd
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Labour-based techniques are not often associated with work on bitumen paved roads, except maybe for the offpavement maintenance. However, there is a widely-used technique in Britain which is based on the use of intermediate equipment. The technique has been part of a British Standard for years, although some very sophisticated equipment is now used, the sophistication has been applied to achieve higher levels of productivity due to the relatively high wage rates currently paid in the UK. In fact, the technique can be carried out very effectively with the most basic equipment - some of it unadapted from agricultural use.

The technique is called "Retread", and has been used in Britain for over 50 years. The idea is simple:

- Take a bitumen road which is potholed, cracked or deformed, and break down the top 75mm to the original constituent materials. This can be achieved using labour or agricultural tractors fitted with a ripper and a towed roller.
- Reshape the profile using a tractor towed grader, add bitumen emulsion, and harrow in the binder using a reciprocating harrow, and roll.
- The voids are sealed and a wearing surface is provided by further applications of binder and aggregate, and a final seal coat results in a new road constructed largely from existing in situ material.

It is important that the drainage system is rehabilitated to ensure the rehabilitated road will not fail prematurely. The rehabilitated pavement will require periodic maintenance reseals as for a normal bitumen surfaced road.

Whilst the process of breaking down the existing road pavement is now carried out in Britain with specially designed planers, tines fitted to an 8-10 tonne road roller were originally employed for this purpose. The use of tractor towed equipment is equally possible.

If the existing road pavement needs strengthening, additional aggregate can be added to build up the pavement thickness, and this approach is adopted in Britain when a weak pavement has led to deformation.

Although some sophisticated (and not cost-conscious) engineers regard the process as old-fashioned, a million square metres are carried out each year in the UK. Because the process relies very heavily on the

knowledge and experience of the crews, it is perhaps best described more as an art than a science. This has made it difficult for some materials engineers who have tried to write specifications. However, the knowledge and experience can be learned, to that the required amounts of binder and size of aggregate needed for each road can be determined. The answer to this problem possibly lies with performance specifications so that the onus is on the contractor to provide an adequate pavement.

Retread is a process suitable for developing countries, with the required ingredients being the existing road pavement, bitumen emulsion, locally available aggregates, and the transfer of the necessary know-how and experience. The required plant comprises haulage vehicles, agricultural tractors, towed graders, bitumen distributors and rollers. The bitumen distributors and rollers may be towed and the gritters can be replaced by labour placed aggregates. The requirements are basic, but the results are soundly engineered, low cost and long lasting. There are additional benefits in the improved conservation of the road materials resources which will satisfy environmental concerns. A further environmental and management attraction is that with the use of emulsions the heating of bitumen on site is avoided in most cases. Of course, to engineers the most important point with severe pressure on budgets is that it is cheaper than conventional paved road rehabilitation. The lower capital requirements for plant also make this technique more attractive to road authorities and contractors.

There is also potential to use the technique for the low-cost upgrading of gravel roads.

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Crushing stony silence

By Crispin Pemberton-Pigott

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Very little of the money spent on research and development goes to solving the problems of low income communities. It is then of no surprise that not many new machines come on the market each year that can make a meaningful change to their lives. New Dawn Engineering however developed the first hand-operated Rock Crusher.

Rock crushing machinery is notoriously energy-hungry. Breaking rocks for a living is a difficult way to make ends meet, and probably even then, it is such lowly paid work that most of us couldn't make our ends meet. A potentially great absorber of unemployed labour, breaking rocks for building concrete and road paving stone is hard on the hands, the eyes and the mind. It is widely done in certain countries and almost not at all in others. One place in South Africa, where hand-breaking stone has become popular, is the small town of Jane Furse, west of Kruger Park. It is a dusty, dry place with little rainfall and much poverty plus a good local market for crushed stone. It is about 120 km from the nearest commercial rock crusher in Grobblersdal. It is that distance plus the high cost of transport that provided the incentive for about 10 women's groups to start breaking stones with hammers, iron bars or just between two hard stones. Their take-home pay (May '96) was a meagre 70 US cents a day, plus a share of eye and hand injuries (a Canadian mining house recently donated safety glasses for each member of the teams). Each woman hand-produced about half a wheelbarrow of sized, crushed stone per day.

It is this meagre production that has kept labour-based aggregate production on the sideline of infrastructure projects in most countries. One of the women's groups took a "we're fed up with this but we are not going to quit" attitude and approached a local NGO called Hlatlolanang - a nutrition project funded by the Kaiser Family Foundation. The Director, Roselyn Mazibuko, took the view that promoting income generation for women was one of the easiest ways to curb malnutrition. She started phoning her friends and contacts to try and get a better technology for breaking rocks. New Dawn Engineering took up the challenge (and a hammer). Two years, and untold hours of head-scratching later, there was a magic moment in the workshop at New Dawn when the first "big red wheel" was unveiled to the public and press.

The criteria for this machine were daunting and, for more than a year, no actual hardware was assembled. Spare time evaporated; of-the-wall suggestions dominated wild-eyed discussions. Yet the only crunching going on was the spreadsheet! Here are the criteria and how we fared:

Criteria	Result

1. Hand operated by one or two people	One person can operate the machine but 4 or 5 people need to dig, load and sort
● portable	200 kg dismantled; it fits into two wheelbarrows
● settings to produce stones in the range 5 to 35mm	Range of 12 to 25mm
● income per person, to increase by a factor of 5	The achieved factor is 7
● production per person to increase by a factor of 25	The achieved factor is 30
● cost under \$ 3,000	Present cost (June '97) \$ 1,450
● little or no lubrication	Only the main side bearings (6309 series), to be greased annually
● able to be maintained by "bush mechanic" or welder	Normal maintenance is the re-building of the teeth on the jaws which requires hard-facing with an arc welder. This can be done without dismantling the drive mechanism
● minimise need for spare parts	Main jaws can be inverted without even welding new teeth on them
● weather resistant (for exclusively outdoor operation)	Sealed bearings are use all round
● incapable of being broken	Handle turned at 180 rpm and during normal operation brought to a dead stop by large hard rock will not break shafts or bearings
● able to crush quartzite (available in Jane Furse)	Crushes quartz and black granite
● ergonomically adaptable	The handle can be mounted in 8 positions with respect to the point of main resistance so it is comfortable for people running it forwards, backwards, pulling or pushing on the handle

The basic research was done in consultation with the women. As Roselyn Mazibuko says: "The women

were not used to being consulted. Their self-esteem is now much greater and they now feel they belong in society. They are preparing their environment for permanency".

Private and government construction of schools, clinics, houses and shops provide a constant demand for stone aggregate. There are strong social and environmental arguments for expanding the use of manual machinery to provide crushed stone on site. Stones are frequently dug up during construction. These can be crushed on site and transportation eliminated. Small sources can be worked, and production decentralised into the areas of high population and low investment potential. Production by hand tends to displace mechanised production, not the other hand-producers. Ore extraction with multiple units in small scale mining is being examined.

On the outskirts of Lusaka, the impoverished stone-breakers of Missie's Compound are found side by side with a huge commercial crusher. In India they sit by the road making feeble piles for surfacing roads. They are, in the words of Roselyn Mazibuko, "People who are poor and who have been made not to believe in themselves, simply because of their poor environment." Here is a technology that can break economic chains and stony silences.

New Dawn Engineering Rock Crusher Specifications, Patent Sa 93/3857

Type	Two jaw plate crusher with hand turned 40 kg eccentric flywheel (700mm dia), max 180 rpm
Power source	Manual, one or two operators, not suitable for motorisation
Price	US\$ 1450.00 at the factory door, uncrated
Crushing pressure	13,000 kg Rock Size (input) 150mm maximum (break larger rocks with sledge hammer)
Gravel size	(output) 10mm to 36mm in 2mm steps (open setting on top hole); 4mm to 30mm in 2mm steps (restricted top hole)
Daily output	10 wheelbarrows (claimed). Users claim 15 (20mm stone)
Mass	200 kg (uncrated)
Dimensions	1300mm x 700mm x 400mm (assembled)
Jaw movement	<10mm, exchangeable eccentric shells can reduce movement
Main bearings	UKFC6309, 2RS (greaseable) and 30mm plain hardened spherical balls with PTFE lubrication (sealed), cartridge units
Main shafts	1450 N/mm ² carbon steel crank handle ball bearing mounted
Swing plate	45mm plate with hardfacing teeth, 3 settings on swing arm

Fixed plate	45mm plate with hardfacing teeth, 5 settings with moveable pin, three settings on each with rotating cam.
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Better handtools for higher productivity

By Ron Dennis, IT Transport, MART programme, Old Power Station, Ardington, OX12 8QJ near Wantage Oxon, UK

Many labour-based works use handtools that are available "of -the-shelf", even if they are of poor quality. There also appears to be little if any systematic monitoring of handtool performance. As a result, workers often have to struggle with poorly finished tools (particularly handles), tools which are not robust enough, and tools which are excessively worn. Better handtools can make a significant impact on labour productivity at little cost. Accepted standards and specifications for handtools are available. So why are poor handtools still being used.

Labour costs are typically around 40% of the total construction costs in labour-based road works, so that the productivity of the labour force obviously has a significant impact on the cost-effectiveness of labour-based methods. Labour productivity is mainly influenced by the effectiveness of organisation, supervision of labour-based activities, motivation of the workforce, and the quality and efficiency of the tools and equipment used. The cost of handtools usually represents 2 to 4% of the total costs, so a small investment in this element has a substantial impact on the productivity.

The first two factors have been investigated for hoes, pick-axes and shovels by de Veen and others in a study in Kenya, in which construction quality tools were compared with farm quality tools. The shapes and sizes of the two sets of tools (construction and farm) were broadly the same and there was little difference in the ergonomic efficiency. The only significant difference found was that workers achieved a 12% higher productivity with the construction type hoes, possibly because they were about 25% lighter than the farm type.

The strength of the farm tools was significantly inferior to that of the construction tools, particularly the handles. 30% of hoe blades and 44% of pick-axes blades of the farm tools also failed, mainly due to lack of hardening of the steel. Using the correct grade of steel, medium-carbon, which allows hardening all the way throughout the tool (not just surface hardening) is important in achieving the strength to resist impact blows. Comparing the hardness measurements, the strength of the steel used for the construction type tools was roughly twice that of the farm tools.

Inadequate strength of tools reduces worker productivity through time lost in repairing or replacing damaged tools and possibly by workers working at a lower rate to reduce the risk of damaging their tools.

The third factor affecting productivity is the wear and damage of the cutting edges and working surfaces of the tool. This has been investigated in the MART programme in tests carried out with the help of a

contractor in Ghana. The photograph on the following page shows a typical comparison of the new and worn pick-axes and shovels used. The average reduction in length of the working surfaces of the worn tool was 47% for the pick-axes and 34% for the shovels. This represents 80 to 90% of the typical wear life of the tools.

Factors affecting handtool quality

The quality of handtools is defined by three factors:

1. Ergonomic efficiency: this relates to the ease and efficiency of use of the tools. The main parameters involved are shape, size, weight and finish of the tool.
2. Strength of the tool: whether the tool will stand up to its intended use without breaking, bending or being permanently distorted. The parameters are shape, size, material and heat treatment.
3. Wear and durability: whether wear of the working edges or surfaces reduces the productivity of the tool and how quickly the tools wears out.

The worn tools reduced worker productivity by an average 22% in the ditching activity and 6% in the sloping activity. Ditching is a more strenuous task than sloping, involving considerable breaking up of the virgin soil where tool efficiency is a significant factor. This probably explains the greater reduction in productivity for the ditching operation and is supported by feedback from the workers whose main complaint regarding the worn tools was the greater effort needed because of the bluntness of the cutting edges.

The abrasion resistance of steels tends to be more dependent on the carbon content of the steel (increasing up to about 0.8% content) than on initial hardness. This was confirmed in the tests in Kenya where there was little difference in the wear rates of the farm and construction type tools, both having carbon contents in the range 0.2 to 0.4% but the construction tools being up to 3 times harder. Further tests are needed to determine whether productivity decreases gradually with wear and to quantify the benefits from changing tools more frequently.

Implications of the effects of tool quality on worker productivity

Workers benefit from having good quality handtools in being able to complete work with less effort and in less time. They are also likely to be less fatigued and suffer fewer injuries such as blisters and muscle strains so that the employer probably benefits from a more satisfied and better motivated work force. The contractor in Ghana stated that there were significant benefits from reduced medical costs for the work force.

The benefits from improved productivity are more difficult to evaluate. If tool costs are 3% and labour costs 40% of total construction costs respectively, then broadly speaking, doubling the cost of tools (for instance buying better tools and/or changing them more frequently) could theoretically be justified by only a 7.5% improvement in labour productivity. However, the realisation of financial benefits depends very much on the organisation and supervision of work. For daily paid work it should be possible to improve output with suitable supervision and motivation of workers. In task work, workers can benefit by completing their task in less time, but whether costs can be reduced by increasing daily tasks to match improved productivity is problematic. A similar problem arises with piece-work - although work could probably be completed in less time thus reducing ancillary operating costs, reduced unit rates may only be established in the longer term.

Improving the quality of handtools used in labour-based roadworks

The ten responses received from a questionnaire sent out to various Labour-based projects indicated that the primary criterion in selecting handtools is ready "off-the-shelf" availability. Brands chosen therefore tend to be the more popular, less costly ones used in agriculture. The productivity of these tools was considered to be satisfactory, but the strength and durability tended to be poor, especially of pick-axes, rakes, spreaders, and wheelbarrows. In addition, there appears to be no monitoring of handtool performance, and tools are thus often excessively worn. There is thus a clear need to improve handtool quality in terms of strength and durability.

The following steps are proposed to promote the use of improved handtools.

- Create greater awareness of the importance of good quality handtools to labour-based road works, particularly with procurement staff. An illustrated brochure may emphasise the benefits of good tools and the penalties of poor tools
- Present specifications in a more concise and readily accessible form. They also need to be backed up by simple tests that can be carried out on site to check that tools comply with specifications. These would comprise: a visual check on shape, dimensions and finish; a blacksmith's test to identify the steel used; and a strength test.
- Co-ordinate markets within countries so that demand is sufficient to encourage ready availability of better quality tools.

It is clear that good quality handtools are important to the cost-effectiveness of labour-based methods and there is general agreement on standard specifications. The primary need is to disseminate this information more widely and effectively as well as to promote improved availability of suitable quality tools.

Further reading:

1. ILO Guide to Tools and Equipment for Labour-Based Road Construction International Labour Office, Geneva. 1981
2. Basil Coukis. Labour-Based Construction Programmes. Published for the World Bank by Oxford University Press, Oxford, UK 1983
3. J de Veen, in collaboration with J Boardman and J Capt. Productivity and Durability of Traditional and Improved Hand Tools for Civil Construction. ILO/FAO, Geneva. December 1981
4. W Armstrong. Better tools for the job. Specifications for handtools and equipment. ITP Publications, UK. 1980
5. J Hamper, D J Mason. Design and Specification for a Standard trailer and hitch for labour-based works, ILO/ASIST, Nairobi. 1997

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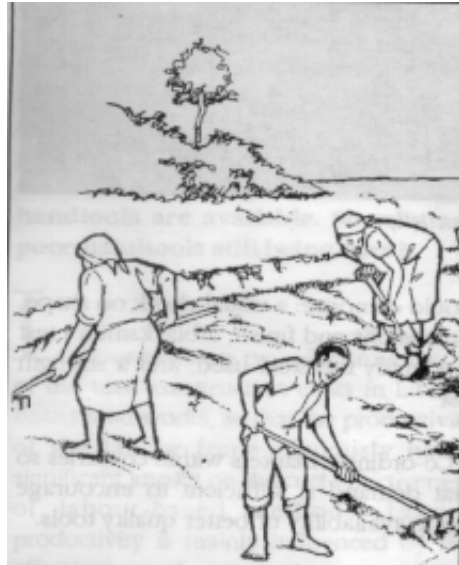
REHABILITATING EARTH AND GRAVEL ROADS

Using an adjustable camber-slope-ditch template saves costs

By Andreas Beusch, Intech Beusch and Co Loestrassse 70, 7000 Chus, Switzerland, e-mail: abeusch@spin.ch

Most construction techniques developed for labour application were designed for a complete new-road construction process.

However, in recent years most labour-based road projects have concentrated on rehabilitation of existing roads. These roads may have an existing (albeit poorly shaped) camber or a running surface which is a sufficiently stable foundation for the rehabilitation process. The heavy earthworks required for full construction are therefore not necessary and would be a waste of scarce resources. An alternative method of strengthening the camber and restoring a functional drainage system has been developed under the Roads 2000 Programme in Kenya. This method saves about 30% to 50% on worker-days compared to the conventional full construction technique.



The method requires the use of an ADJUSTABLE CAMBER-SLOPE-DITCH TEMPLATE. This template represents the finished profile of half of the road. The template used in Kenya can be adjusted to different cross-sections (carriageway widths), but has a standard shoulder slope length of 1.20m and ditch of 0.60m width. These measurements can of course be changed and adapted to the specific standards required. The template can be locally fabricated.

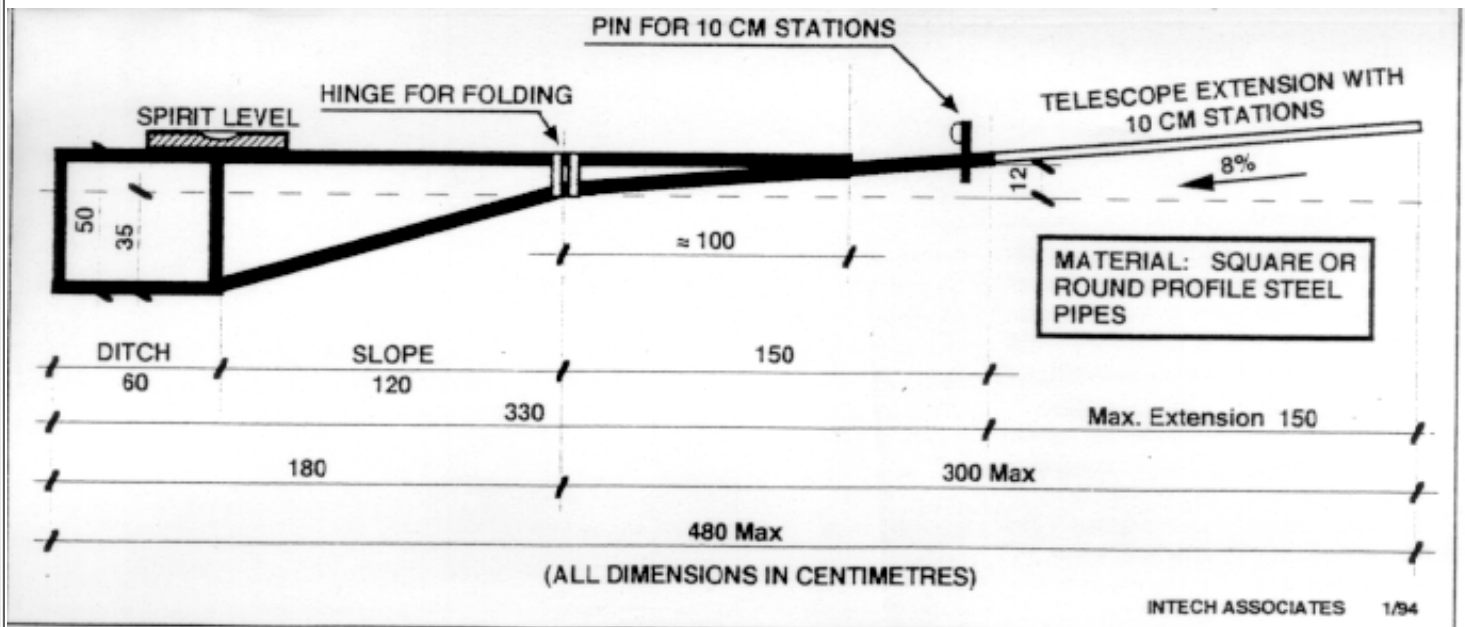
The template is used to establish the camber levels at 10 metre intervals along the road. The levels are set by slots extending across the whole cross-section (from back of ditch to back of ditch). The slots are constructed to generally balance the amount of cut and fill at each 10 metre cross section. The slots will then guide the labour gangs on how much material has to be excavated from the ditch and used as fill between the slots. In this way the need to excavate to level is avoided, which reduces the workerday requirements significantly.

The shoulder and ditch are uniform for all roads. In exceptional cases, where the material from the ditch and shoulder is not sufficient to raise the carriageway to the required levels, it will be necessary to widen the ditch or cut the backslope until enough material has been gained. Poor ditch material should not be used on the carriageway but be discarded away from the road.

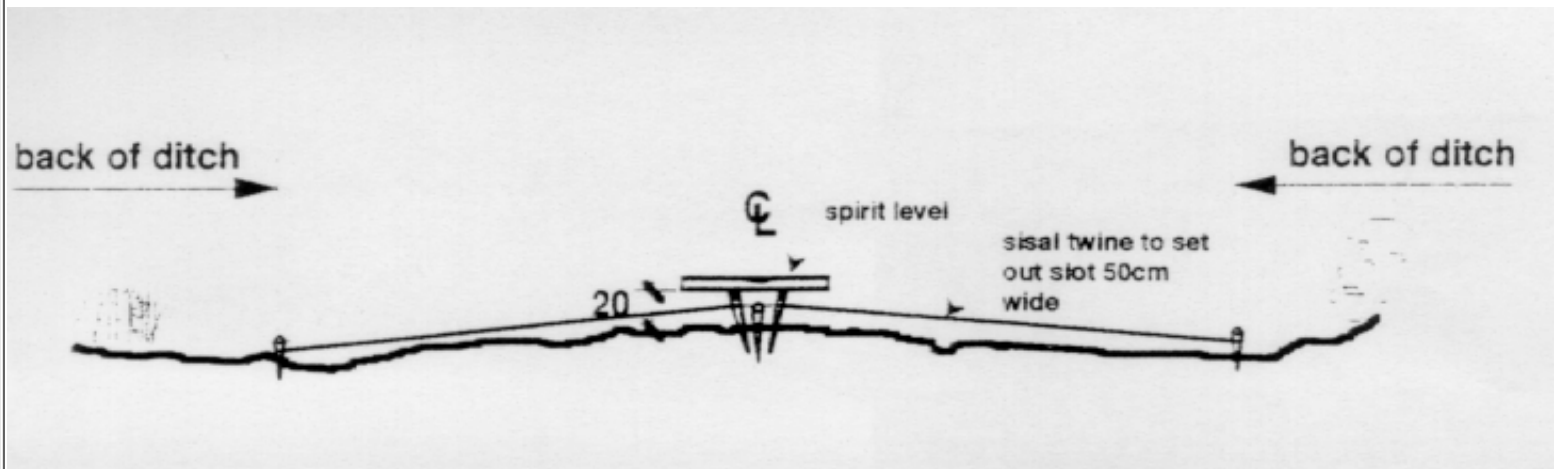
The setting out of levels and slots should be carried out by the Overseer or a well trained Headperson. In any case the Overseer should be responsible for checking all levels before excavation work starts. Correct setting out will save resources. A special slotting-gang consisting of a capable Headperson and three labourers should be trained. Depending on the excavation progress there may be a need to have two slotting gangs in order to provide sufficient slots for the following day's workgangs.

On roads with heavy traffic, this method allows the work to be carried out over a section of road on one half of the carriageway only at a time. The traffic has therefore to be diverted to the other half of the road and the required signs, control and safety measures must be provided for. Where possible the road should be closed, or a diversion arranged, if the traffic is particularly heavy.

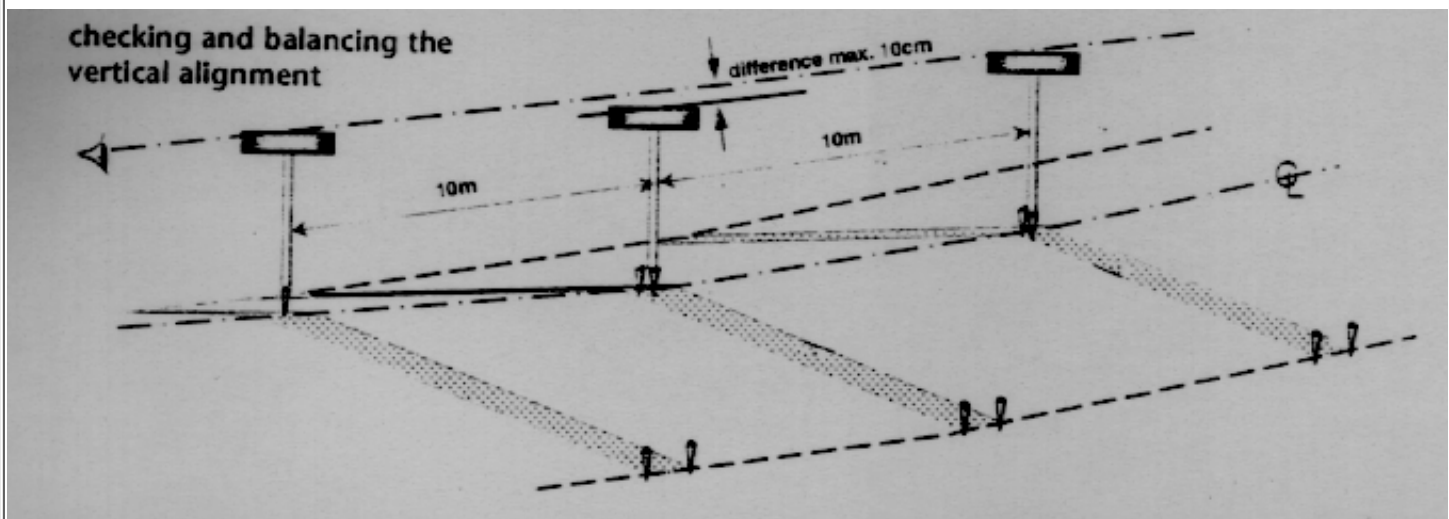
pecification of the Adjustable Camber-Slope-Ditch Template



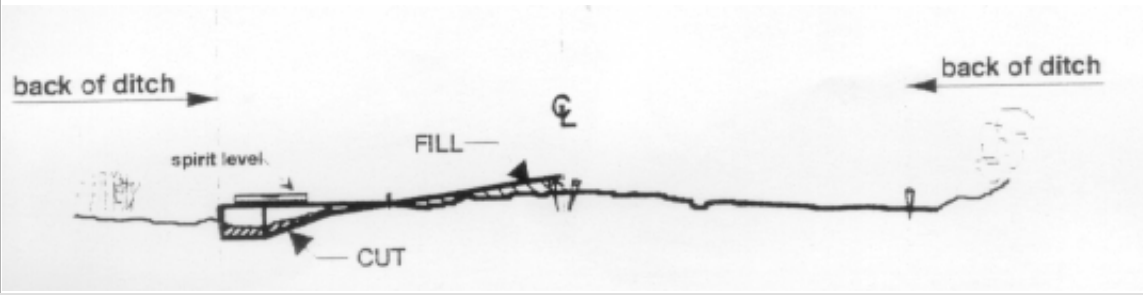
Set out Slots



heck Vertical Alignment



Excavate / Fill Slot



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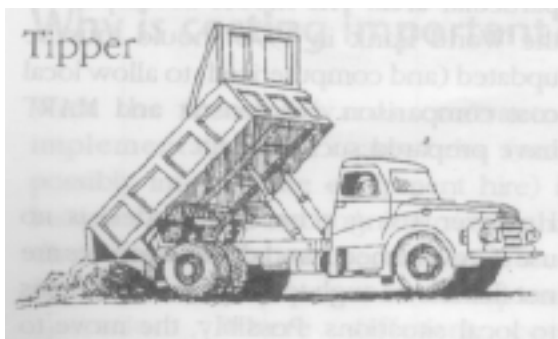
A Programme executed by the Employment-Intensive Investment Branch (EMP/INVEST) of the ILO

[Asist Bulletin no. 6,](#)

September 1997

THE END OF THE TRACTOR AND TRAILER?

Interview with Walter Illi, Norconsult Nairobi, by David Mason and Jan Fransen, ILO/ASIST, Harare



Many labour-based works use a tractor-trailer combination to haul material, since this is considered to be the cheapest and most appropriate technology. However, Walter Illi argues that in recent years the tractor-trailer combination has been all but priced out of the market by cheaper trucks and tippers.

Options

Haulage can be done by many methods. For up to 300 metre haulage distance, economically viable methods are a wheelbarrow, handcart, bicycle cart, or just carrying the material by hand or headloading.

Animal traction is another option, which has been piloted in various projects. It proved to be economically competitive up to 2 to 3 km haulage distance, but animals are not always available, the terrain is not always suitable (flat or rolling), nor is the use of animals to carry heavy loads always culturally acceptable. Changing people's attitudes is a difficult and time-consuming process.



For haulage distances over 300 metres, the most viable options are a tractor with trailers or a truck. The discussion thus focused on these choices.

World Bank Guide for Labor-based Construction Programmes, 1976

The World Bank Report of 1976 compared fixed and running costs of a truck with a tractor / trailer combination. Fixed costs of the truck were lower, though the price differences were not very great. Running costs of a tractor with two trailers were however considered to be lower, leading to the conclusion that a tractor / trailer combination was cheaper up to a haulage distance of about 10 km

However, there were other reasons to prefer a tractor / trailer combination:

- Tractors and trailers were simpler to maintain
- Tractors and trailers were seen as simpler, more appropriate equipment
- Trucks were more likely to be misused within the government system.

Situation in 1997

Since 1976 the situation has changed considerably. Most notably, the prices of tractors and trailers have gone up, and are now in many countries about twice as expensive as trucks, per m³ haulage capacity. This is true even though VAT and import duties are paid on trucks and not to the same extent on tractors and trailers, which are classified as agricultural equipment. The main reasons for this change in costs are the increased availability and competition in trucks, and the fact that tractors nowadays are more sophisticated and have higher horse power capacity coupled with lower haulage capacity (thus increasing cost per haulage capacity).

Other reasons to select a tractor / trailer combination have changed as well:

- Tractors have become more sophisticated and thus, it may be argued, less "appropriate", while maintenance becomes more complex. On the other hand, with the increased use of trucks, the capacity to maintain them has increased drastically in most countries.
- Trailers for haulage of gravel need to be specifically designed to be able to handle the heavy and dense material. Trucks can be bought off-the-shelf. A truck is also multi-purpose, while the trailer is designed specifically for dense material.
- Misuse of trucks within government departments is not a valid argument in the private sector. Contractors, when properly trained, should be allowed to choose cost-effective and multi-purpose equipment.
- The World Bank report assumed that a tipping trailer would be a cost-effective option as well. However, after years of experimenting in which the hydraulic systems broke down, it has to be concluded that tipping trailers are not a viable option.

Purchase costs of tractor / trailers and trucks

In US\$ per m haulage capacity

1976 1997 Increase

Truck 2,417 (6 m³) 8,683 (5 m³) 359 %

Tractor / 2 trailers 3,457 (3.5 m³) 15,649 (2.4-2.8 m³) 453 %

Truck prices are from Kenya and include VAT. Tractor / 2 trailer prices are from international tender, and are exempted from VAT

Running costs of a tractor / trailer combination are still lower than that of a truck, but the cut-off point between the two has clearly moved down in favour of the truck. Trucks can now be expected to be cheaper for haulage distances of two / three km and more, and competitive from one km onwards!

Two questions remain before a choice on economic considerations can be made:

1. what if the utilisation rate of trucks is compared to that of tractor/trailers? If trucks were to break down more often, a tractor with trailers could remain cost-effective. Little study has been done on

the utilisation rate of trucks, though a pilot contractor project in Nyeri, Kenya, indicates high utilisation rates for trucks.

2. Are tractors also used for towed graders or other equipment? This may reduce unit costs, since the tractor will then be multi-purpose.

Towards effective procurement

The decision on labour-based equipment and tools should be made on sound economic and technical reasoning. This requires using economic models, using the actual delivery and operating costs in a particular area. The model developed by the World Bank in 1976 should thus be updated (and computerised) to allow local cost comparison. Norconsult and MART have prepared such models.

However, using economic models is no use if governments and donor agencies are not flexible enough to adapt their decisions to local situations. Possibly, the move to contractor development can create this flexibility.

Notes: The design of a trailer for gravel haulage is available at ILO/ASIST (Technical Brief 1). The trailer can also have doors, which can decrease off-loading time by up to 30%

A full report on haulage equipment will be presented during the regional seminar for labour-based practitioners, 29 September – 3 October 1997

Choosing the right equipment for haulage:

Equipment When to consider Comments

- Wheelbarrow up to 300 metres needs a strong design
- Hand cart in congested areas strenuous work
- Animal traction up to 2 or 3 km when acceptable: flat terrain
- Tractor/trailers up to 2 or 3 km needs special design of trailer
- Trucks/tippers more than 2 or 3 km competitive from 1 km

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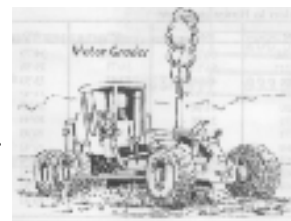
COSTING EQUIPMENT

BY Rob Petts, MART, Leicestershire, LE11 3TU, UK

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Why is costing important?

With the trend towards contractor implementation of roadworks (and possibly intermediate equipment hire) it becomes essential that both contractors and client's representatives become aware of the true costs of equipment ownership and operation. Where different cost components are managed in separate departments/accounts (e.g. investment, replacement, workshop support and operation) it is particularly important to appreciate the cost implications for each component.



What is shown in the centrespread?

The example in the centrespread has been developed to demonstrate how a piece of equipment can be costed. A similar approach will be used in the MART equipment guidelines which are currently under preparation. The costs have three components: fixed, operational and overheads.

Assumptions

The system allows the owner/user to make assumptions regarding the many variables affecting the cost of a piece of equipment. It must be appreciated that the ACTUAL overall costs will not be known until the day the piece of equipment is actually sold or scrapped. Costing depends on good record keeping and a realistic appreciation and assessment of a range of important historical, current and future factors.

Costs are particularly sensitive to annual utilisation rates as (see table A & B). Whereas many equipment items are designed to achieve annual utilisation of 1,000 to 1,500 hours of work for economic ownership, significantly lower utilisation can be extremely expensive and uneconomic. The system demonstrates that for most roadworks in developing countries the operating environment is particularly unfavourable to the use of sophisticated plant..

Motor grader versus towed grader

For the centrespread example the costing system has been used to compare the costs of a 120 hp motor grader with a 100 hp 4WD agricultural tractor and heavy towed grader. Both machines are capable of similar physical performance as demonstrated by the *Roads 2000* project in Kenya. The motor grader hourly physical output is expected to be some 20% higher than the tractor and towed grader combination. However, the higher availability and flexibility of tractor use should allow higher utilisation and therefore much lower unit work costs.

For the example calculation the following assumptions were made:

The assumption made for the motor grader utilisation is particularly optimistic and the lower utilisation figures achieved by many organisations make for interesting calculations! Even the tractor and heavy towed grader will require good management to achieve the assumed level of utilisation.

It may be concluded from the tables that the motor grader is much more expensive in US\$/day. Once the productivity is known (in output/day), it can be decided which is cheaper per km grading. This mainly depends on the utilisation rate of the equipment, which in turn depends on the availability of maintenance, efficient planning of work, et cetera.

A study by Kisii Training Centre and the Minor Roads Programme in Kenya concluded tentatively that the motor grader is cheaper than the towed grader per km grading, if working properly. However, in isolated rural areas and inefficient Government bureaucracies, chances are that utilisation rates of the motor grader are low and the actual cost per km grading thus high (the next Bulletin will report on this study).

Assumptions Motor Grader Tractor + Towed Grader

Finance Interest Charge 20 % per annum 20 % per annum

Purchase Cost assumed in

Tables A & B US\$ 200,000 US\$ 90,000

Actual Purchase Cost

(adjustment) 12 years 10 years

Annual Utilisation (hours) 600 800 hours

(eg 100 days @ 6 hours)

Cost Calculation: 100hp, 4WD Tractor & Towed Grader, and 120 hp Motor Grader

Total hourly charge comprises:

OWNERSHIP + OPERATING + OVERHEAD COSTS

Ownership costs comprise:

DEPRECIATION or REPLACEMENT (Table A1) and

FINANCE CHARGE (Table B1, B2, or B3)

All tables A & B: Costs in US\$ per hour for towed Grader/Motor Grader

A1 – Depreciation or Replacement (Table A1)	
Economic Life	Utilisation in Hours per Year Towed Grader/Motor Grader

Years	200	400	600	800	1,000	1,200	1,400	1,600
1	450/1000	225/500	150/333	113/250	90/200	75/167	64/143	56/125
2	225/500	113/250	75/167	56/125	45/100	38/83	32/71	28/63
3	150/333	75/167	50/111	38/83	30/67	25/56	21/48	19/42
4	113/250	56/125	38/83	28/63	23/50	19/42	16/36	14/31
5	90/200	45/100	30/67	23/50	18/40	15/33	13/29	11/25
6	75/167	38/83	25/56	19/42	15/33	13/28	11/24	9/21
7	64/143	32/71	21/48	16/36	13/29	11/24	9/20	8/18
8	56/125	28/63	19/42	14/31	11/25	9/21	8/18	7/16
9	50/111	25/56	17/37	13/26	10/22	8/19	7/16	6/14
10	45/100	23/50	15/33	11/25	9/20	8/17	6/14	6/13
11	41/91	20/45	14/30	10/23	8/18	7/15	6/13	5/11
12	38/83	19/42	13/28	9/21	8/17	6/14	5/12	5/10

B1 – Finance charge @ 10%			Finance Charge in US\$ per Hour					
Economic Life	Utilisation in Hours per Year Towed Grader/Motor Grader							
Years	200	400	600	800	1,000	1,200	1,400	1,600
1	45/100	23/50	15/33	11/25	9/20	8/17	6/14	6/13
2	34/75	17/38	11/25	8/19	7/15	6/13	5/11	4/9
3	30/67	15/33	10/22	8/17	6/13	5/11	4/10	4/8
4	28/63	14/31	9/21	7/16	6/13	5/10	4/9	4/8
5	27/60	14/30	9/20	7/15	5/12	5/10	4/9	3/8
6	26/58	13/29	9/19	7/15	5/12	4/10	4/8	3/7
7	26/57	13/29	9/19	6/14	5/11	4/10	4/8	3/7
8	25/56	13/28	8/19	6/14	5/11	4/9	4/8	3/7
9	25/56	13/28	8/19	6/14	5/11	4/9	4/8	3/7
10	25/55	12/28	8/18	6/14	5/11	4/9	4/8	3/7
11	25/55	12/27	8/18	6/14	5/11	4/9	4/8	3/7
12	24/54	12/27	8/18	6/14	5/11	4/9	3/8	3/7

B2 – Finance charge @ 20%								
Economic Life	Utilisation in Hours per Year Towed Grader/Motor Grader							
Years	200	400	600	800	1,000	1,200	1,400	1,600
1	90/200	45/100	30/67	23/50	18/40	15/33	13/29	11/25
2	68/150	34/75	23/50	17/38	14/30	11/25	10/21	8/19
3	60/133	30/67	20/44	15/33	12/27	10/22	9/19	8/17
4	56/125	28/63	19/42	14/31	11/25	9/21	8/18	7/16
5	54/120	27/60	18/40	14/30	11/24	9/20	8/17	7/15
6	53/117	26/58	18/39	13/29	11/23	9/19	8/17	7/15
7	51/114	26/57	17/38	13/29	10/23	9/19	7/16	6/14
8	51/113	25/56	17/38	13/28	10/23	8/19	7/16	6/14
9	50/111	25/56	17/37	13/28	10/22	8/19	7/16	6/14
10	50/110	25/55	17/37	12/28	10/22	8/18	7/16	6/14
11	49/109	25/55	16/36	12/27	10/22	8/18	7/16	6/14
12	49/108	24/54	16/36	12/27	10/22	8/18	7/15	6/14

B3 – Finance charge @ 30%								
Economic Life	Utilisation in Hours per Year Towed Grader/Motor Grader							
Years	200	400	600	800	1,000	1,200	1,400	1,600

1	135/300	66/150	45/100	34/75	27/60	23/50	19/43	17/38
2	101/225	51/113	34/75	25/56	20/45	17/38	14/32	13/28
3	90/200	45/100	30/67	23/50	18/40	15/33	13/29	11/25
4	84/188	42/94	28/63	21/47	17/38	14/31	12/27	11/23
5	81/180	41/90	27/60	20/45	16/36	14/30	12/26	10/23
6	79/175	39/88	26/58	20/44	16/35	13/29	11/25	10/22
7	77/171	39/86	26/57	19/43	15/34	13/29	11/24	10/21
8	76/169	38/84	25/56	19/42	15/34	13/28	11/24	9/21
9	75/167	38/83	25/56	19/42	15/33	13/28	11/24	9/21
10	74/165	37/83	25/55	19/41	15/33	12/28	11/24	9/21
11	74/164	37/82	25/55	16/41	15/33	12/27	11/23	9/20
12	73/163	37/81	24/54	16/41	15/33	12/27	10/23	9/20

COST CALCULATION 120hp MOTORGRADER

CONVERSION TO DAILY CHARGE RATE

INTEREST RATE ASSUMED 20% **OWNERSHIP COSTS**

C Adjustment for Actual Cost of Purchase

Selected Depreciation/replacement charge (US\$/hr) from Table A1 28 (C1)

Selected Finance charge (US\$/hr from Table B1, B2 or B3 36 (C2)

Actual purchase/replacement cost in US\$ 195,000 (C3)

Assumed number of operating hours per day 6 (C4) local currency

Daily ownership cost = (C1 + C2) x C4 x C3 / 200,000 US\$/day 374.4 (C)

D Adjustment for Expected Residual/Scrap Value (if any)

Assumed Residual/Scrap Value in US\$ 10,000 (D1)

Assumed Economic Life in years 12 (D2)

Assumed Utilisation in Hours / Year 600 (D3) local currency

Adjustment for Scrap Value = (D1 x C4) / (D2 x D3) US\$/day 8.3 (D)

Sub-Total for Ownership Costs 366.1 (X)

OPERATING COSTS

E Spares & Consumables

Either predict daily costs from past records or select from the following:-

Select percentage of spares and consumables per year compared to machine cost new

Suggested value between 5 and 12% (usually increases with age) 8 % (E1) local currency

Daily cost of Spares = $0.01 \times C3 \times C4 \times E1 / D3$ US\$/day 156.0 (E)

F Servicing and Repair (Workshop Labour Cost)

Either predict daily costs from past records or select from the following:- 25 % (F1) local currency

Suggested value between 25% and 100% of (E) **US\$/day 39.0 (F)**

G Fuel & Lubricants

Cost of fuel per litre (add between 2 and 5% to cover lubricant costs) 0.4 (G1)

Assumed fuel consumption in litres per hour 18 (G2) local currency

Daily Fuel Cost = $C4 \times G1 \times G2$ US\$/day 43.2 (G)

H Operators (Daily Costs)

Wages Allowances Other

Operator 12 8 3

Assistant - - -

Banksman 6 - - local currency

Sub-totals 18 8 3 US\$/day 29.0 (H)

Sub-Total for Operating Costs 267.2 (Y)

OVERHEADS (& PROFIT)

Predict from past records to include:

Offices, Workshops, Tools & other Facilities

Supervisory, management and clerical personnel

Supervision and support vehicles

Stores and other stock

Insurances

Banking and other finance charges not relating to the equipment item

Admin, training, safety or other overhead costs

Risk, late payment and other contingency items

Profit local currency

Sub-Total for Overheads and Profit 200.0 (Z)

local currency

TOTAL COST TO BE CHARGED = $X + Y + Z$ = US\$/day 833.3

NOTES

1. Finance Charge (overleaf) calculated by the formula:-

$C2 = \frac{(N + 1)}{2N} \times \text{Purchase Price} \times \text{interest rate expressed as a decimal}$

Hours per Year

Where N = number of years (economic life)

COST CALCULATION 100 hp 4WD TRACTOR + TOWED GRADER (5t)

CONVERSION TO DAILY CHARGE RATE INTEREST RATE ASSUMED 20 %

OWNERSHIP COSTS

C Adjustment for Actual Cost of Purchase

Selected Depreciation/replacement charge (US\$/hr) from Table A1 11 (C1)

Selected Finance charge (US\$/hr from Table B1, B2 or B3 12 (C2)

Actual purchase/replacement cost in US\$ 88,000 (C3)

Assumed number of operating hours per day 6 (C4) local currency

Daily ownership cost = (C1 + C2) x C4 x C3 / 200,000 US\$/day 134.9 (C)

D Adjustment for Expected Residual/Scrap Value (if any)

Assumed Residual/Scrap Value in US\$ 5,000 (D1)

Assumed Economic Life in years 10 (D2)

Assumed Utilisation in Hours / Year 800 (D3) local currency

Adjustment for Scrap Value = (D1 x C4) / (D2 x D3) US\$/day 3.8 (D)

Sub-Total for Ownership Costs 131.2 (X)

OPERATING COSTS

E Spares & Consumables

Either predict daily costs from past records or select from the following:-

Select percentage of spares and consumables per year compared to machine cost new

Suggested value between 5 and 12% (usually increases with age) 8 % (E1) local currency

Daily cost of Spares = 0.01 x C3 x C4 x E1 / D3 US\$/day 52.8 (E)

F Servicing and Repair (Workshop Labour Cost)

Either predict daily costs from past records or select from the following:- 25 % (F1) local currency

Suggested value between 25% and 100% of (E) **US\$/day 13.2 (F)**

G Fuel & Lubricants

Cost of fuel per litre (add between 2 and 5% to cover lubricant costs) 0.4 (G1)

Assumed fuel consumption in litres per hour 15 (G2) local currency

Daily Fuel Cost = C4 x G1 x G2 US\$/day 36.0 (G)

H Operators (Daily Costs)

Wages Allowances Other

Operator 12 8 3

Assistant 10 8 3

Banksman 6 - - local currency

Sub-totals 28 16 6 US\$/day 50.0 (H)

Sub-Total for Operating Costs 152.0 (Y)

OVERHEADS (& PROFIT)

Costing Equipment - ASIST

Predict from past records to include:

Offices, Workshops, Tools & other Facilities

Supervisory, management and clerical personnel

Supervision and support vehicles

Stores and other stock

Insurances

Banking and other finance charges not relating to the equipment item

Admin, training, safety or other overhead costs

Risk, late payment and other contingency items

Profit local currency

Sub-Total for Overheads and Profit 100.0 (Z)

local currency

TOTAL COST TO BE CHARGED = X + Y + Z = US\$/day 383.2

NOTES

1. Finance Charge (overleaf) calculated by the formula:-

$C2 = \frac{(N + 1)}{2N} \times \text{Purchase Price} \times \text{interest rate expressed as a decimal}$

Hours per Year

Where N = number of years (economic life) [[Back](#)][TOCNext](#)



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DIARY OF FORTHCOMING EVENTS

In labour-based and rural transport programmes

1997

Course: *Road rehabilitation and maintenance*, 15 September – 10 October, Swaziland

Meeting: *Annual Road Convention*, 24-26 September, National Construction Council, Dar es Salaam

Seminar: *Sixth regional seminar for labour-based practitioners*, 29 September – 3 October, Ministry of Works, Transport and Communications and ILO/ASIST, Jinja, Uganda, fee of US\$ 350 to cover all sessions, course material, transport within Uganda, and lunch

Course: *Sustainable Water Supply and Sanitation*, 29 September – 21 November, WEDC, Loughborough, UK, fee of £ 4,480, excludes accommodation

Course: *Community management of development projects in water, sanitation, and health*, 29 September – 12 December, certificate course, University of Bradford, UK, fee of £ 7,950 covers cost of tuition, accommodation, and course materials

Course: *International Engineers Course*, 6 October – 21 November (7 weeks), Kisii Training Centre, Kenya, fee of US\$ 4,700 includes accommodation, meals, training and course notes

Course: *Road maintenance planning and management*, 27 October – 28 November, ESAMI, Arusha, Tanzania, fee to include tuition and training materials

Meeting: *PIARC British National Congress*, 5 – 7 November, Manchester, UK. E-mail: Hemming@dial.pipex.com; fax: UK 171 9736600

Course: *Transportation planning: a gender approach*, 17 – 28 November, ESAMI, Luanda, fee to include tuition and training materials

Meeting: *First African Transport Forum*, 26 – 27 November, Economic Commission of Africa, hosted by Ministry of Transport and Communications in Egypt

Course: *Professional Development Programme: Infrastructure for Urban Water Supply: Rural Infrastructure Development: Urban Infrastructure*. 25 November to 13 December, WEDC, Loughborough, UK fee of £ 1,875 excludes accommodation

Course: *Managing and Financing Rural Transport. Training programme for senior road executives*, 1 –

11 December, TRL, World Bank and DFID, Washington DC, USA

1998

Meeting: *77th Transportation Research Board Annual Meeting, 11 – 15 January Washington DC, USA*

Course: *Management of labour-based contractor road works, 12 –23 January, Intech Associates and TRL, Zimbabwe (see page 21)*

Course: *Contractor Development; Urban infrastructure; Water for low-income communities; Solid Waste Management. 2 – 20 February, WEDC, Loughborough, fee of US\$ 1,920 excludes accommodation*

Course: *Participatory Irrigation Development: Sewerage and Drainage; Urban Planning and Management, 12 – 30 February, WEDC, Loughborough, UK fee of US\$ 1,920 excludes accommodation*

Course: *International training of trainers course, 16 February – 28 March, Kisii Training Centre, Kenya, fee of US\$ 3800 includes accommodation, meals, training and course notes*

Course: *Low-cost sanitation, 23 February – 13 March, WEDC, Loughborough, UK, fee of US\$ 1,920 excludes accommodation*

Course: *Planning, financing and management of infrastructure projects, 20 April – 10 July, University of Bradford, UK, fee of £ 7950 covers tuition, accommodation, course materials*

Course: *International Senior Technicians Course, 25 May – 11 July, Kisii Training Centre, Kenya, fee of USD\$ 4800 includes accommodation, meals, training and course notes*

Course: *Appropriate Technology Road works for Developing Countries, 22 – 26 June, TRL, UK, fee of £ 1450 includes accommodation, meals, notes and site visits*

Course: *International Engineers Course, 5 October – 21 November, Kisii Training Centre, Kenya, fee of US\$ 4800 includes accommodation, meals, training and course notes*

GENERAL

Habitat Training and Capacity Building Section organises national seminars for target groups on demand

DIPLOMA / MASTER COURSES

Infrastructure in low-income urban communities, Water Supply and sanitation for low-income communities, diploma course, 5 month distance learning programme, WEDC, Loughborough, UK. Masters programmes of WEDC (water, environment, waste, and urban services and infrastructure), Loughborough University, UK, fee of £ 9,490, excludes accommodation.

Diploma Programme: Community Technology for Rural Development; Project Preparation for Environmental Engineering. 29 September - 12 December, WEDC, Loughborough, UK, fee of US\$ 5,760, excluding accommodation

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ASIST TECHNICAL ENQUIRY SERVICE

ASIST offers A Technical Enquiry Service (TES) which provides technical information on, and related to, labour-based technology on request to projects, consultants, policy makers, donors, training institutions and others interested in labour-based methods and management. Every year we receive over 300 requests by letter, e-mail, phone, fax, and through visits to TES.

To support the Technical Enquiry Service ASIST actively collects both published and unpublished documents on labour-based roadworks, urban infrastructure development, rural transport and related topics. The collection includes text books, research reports, project reports, technical manuals, training material, periodical articles, journals, newsletters and other material, most of which is in English, and a small number in French and Portuguese.

A computerised bibliographic database is maintained to facilitate quick and easy access to the collection of over 6000 documents. The database contains keywords of all technical documents to facilitate thorough searching and retrieval of relevant information to satisfy the requests we receive.

ASIST also has links to other information resources around the world, and maintains contact with experts in the field that can be called upon to provide technical advice or information.

If you require technical advice or information on labour-based technology for infrastructure development, contact the TES by main, fax, telephone or e-mail at our offices in Nairobi or Harare

You are also welcome to visit us!!

BIBLIOGRAPHIC DATABASE ON LABOUR-BASED TECHNOLOGY (ASISTDOC)

The ASIST bibliographic database of over 6000 labour-based technology publications is available for distribution on computer diskette. You can order a read-only version of the database for quick and easy access to bibliographic details of publications available from ASIST's Document Centre. The database software provides an extremely user-friendly search interface that allows you to quickly search for information you would like to receive. The database software runs under Window 3.1, 3.11 or Window 95.

One Year Subscription: US\$ 25

Available from ASIST, Information Service.

A CD-ROM Version will be published in 1998.

NEW ASIST PUBLICATIONS

Asist Technical Brief No: 1

Designs and Specifications for a Standard Trailer and Hitch for Labour based Works. Third Revised Edition.

Jim Hamper, David Mason, David Jennings, Collins Makoriwa and David Stiedl. ASIST, Nairobi. July 1997. 37pp. Price: US\$ 5.50

Gives full technical specifications and drawings for a standard design for a three cubic meter trailer and hitch developed under the Kenya Minor Roads Programme. Recommendations of the type of tractor that should be used with the trailer are also included.

Labour-based technology

A review of current practice. Proceedings and papers of the fifth regional seminar for labour-based practitioners in the road sector in Sub-Saharan Africa. Theme of the Seminar: Labour-based contracting DFR, Accra Ghana, 22 – 26 April, 1996

Jan Fransen, Angela Kabiru and David Mason (Eds.) Two volumes. CTP 144/5. ILO/ASIST, Nairobi. 1996. 75pp; 286pp ISBN 1020-4962. Price: US\$ 7.50: 25.00.

Vol. 1 presents a summary of the seminar proceedings and group discussion. Vol. 2 contains the plenary papers presented.

ROMAR Training Guidelines

ROMAR Road maintenance and regravelling. Entrepreneurship development for labour-based road maintenance contractors. Training Guidelines

Andreas Beusch and Claes-Axel. ILO/ASIST, Nairobi. 1997. 266 pp. Price: US\$ 23.00

Many Countries are training small scale contractors of labour-based road maintenance programmes. Various manuals are available to assist them in setting up a training course, such as the Routine Maintenance and Regravelling (ROMAR) series and the Improve Your Construction Business (IYCB) series. However, to date there were no guidelines on how to set up a training course.

This gap has now been filled, by the "ROMAR Training Guidelines." The guidelines explain how the ROMAR and IYCB material can be used to develop a training programme for small-scale contractors. They contain practical advice and examples, checklists, draft training programmes, overhead charts, evaluation forms and much more.

The Labour-based Technology Source Book

A catalogue of Key publications.

ILO/ASIST, Nairobi. July 1997. 60 pp.

This year's ASIST publications catalogue has now been produced as a source book. It contains over 150 annotated titles of key publications on labour-based technology. The titles are listed under the following subject headings: Technology Choice, Road Construction and Maintenance, Tools and Equipment, Training, Construction Management and Contracting, Urban Infrastructure Development, Rural Travel and Transport, Labour and Employment, Project Planning and Evaluation. An index has been included to facilitate quick access to the titles. To receive a free copy please contact the TES (ILO/ASIST Nairobi)

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ASIST

ADVISORY SUPPORT INFORMATION SERVICES AND TRAINING FOR LABOUR BASED PRACTITIONERS

A Programme executed by the Employment-Intensive Investment Branch (EMP/INVEST) of the ILO

[Asist Bulletin no. 6,](#)

September 1997

ASIST NEWS

ASIST III on the move

In September 1996, a meeting took place in Harare to decide on the future of ASIST. ASIST II would come to an end in June 1997, and clients, donors, consultants and ASIST staff met to decide what to do next.

Clients expressed a continued, though changing, need for support to labour-based programmes, which resulted in a somewhat changed mandate for ASIST III. The most significant change is that the mandate has been widened. Promoting labour-based works in urban infrastructure has been added, and ASIST has been mandated to consider options for labour-based approaches in *other* sectors, world wide, if additional resources are available. The project on rural travel and transport remains part of the ASIST programme. ASIST III, however, will still concentrate on promoting and mainstreaming labour-based approaches in rural roads.

ASIST III will continue to provide advisory support, training, and information services. These services will be integrated to a greater extent, and the Harare and Nairobi offices will both provide all services. The aim is to make information better accessible to our clients, by more information dissemination, more technical briefs, and by developing information through the Internet and CD-ROM. More attention will specifically be given to contractor development, and labour standards and working conditions in labour-based projects.

Another mandate for ASIST III is to institutionalise the services by the year 2000.

The World Interchange Network

ILO ASIST has recently become a Node of the World Interchange Network (WIN)

The World Interchange Network is an initiative established in 1995 by various international organisations, such as the World Road Association (PIARC), the Organisation for Economic Co-operation and Development (OECD) and the World Bank. WIN's objective is to promote global exchange of road-related information and knowledge, to put people in need of expertise or information in touch with those who are able to provide this through the use of local, national, international and global networks and by building on existing systems, being driven by user needs.

As a node, the ASIST Information Services will continue to promote and facilitate road-related information and knowledge transfer. Requests for expertise are addressed to us either directly from Network users or through other nodes. Where we are unable to provide the requested expertise or information we will put enquirers in touch with people who can.



ASIST staff in Harare

- David Stiedl, the ASIST Director left ASIST on 31 July, and will be replaced as soon as possible
- Jane Tourneé joined ASIST Harare as senior technical adviser, replacing Mike Shone who has left for Asia
- Gamelihle Sibanda is the new technical adviser, replacing Collins Makoriwa, who joined SweRoad in Zimbabwe.
- Fatemeh Ali-Nejadfard manages the Integrated Rural Accessability Planning Project, assisted by Kenneth Otero
- Tomas Stenström will replace Maria Lennartson as technical adviser
- Administrative support is given by Monica Sombo, Phillipa Tsiga, and Lorraine Moses.

ASIST staff in Nairobi

- David Mason remains the training and information manager, but has been given additional responsibility in advisory support.
- Wilma van Esch joined ASIST after her ILO assignment in Dar es Salaam to manage the urban infrastructure component.
- Angela Kabiru continues as the information co-ordinator, now assisted by Annabel Chite in Nairobi and Ida Chimedza in Harare.
- Jan Fransen co-ordinates training and urban infrastructure, now supported by Samuel Orwa for training.

Administrative support is given by Beatrice Okwemba, Felister Gitqu and Irene Njoroge

STANDARDS AND CONDITIONS OF WORK

By Jan Fransen, ILO/ASIST

Promoting fair standards and conditions of work in labour-based programmes is becoming increasingly important as the scale of programmes expands and the private sector involvement increases. This is the

more so as the private sector will be largely represented by recently established small-scale organisations unfamiliar or unconcerned with working conditions and labour standards.



Fair labour standards and conditions of work imply that workers and employers are aware of their rights and obligations, that workers have the opportunity to be employed without gender or political discrimination, that forced and child labour are not used in the programmes, and that wages, working hours, and health and safety conditions are in line with nationally negotiated levels and ILO standards. Fair conditions and labour standards can be set at the national or local level, through Collective Bargaining. This entails negotiations between employers' and workers' representatives, and possibly government, and is a method to set conditions and standards of work that are in accordance with local conditions.

Various ILO studies indicate that better working conditions lead to higher productivity. Since worker motivation increases, the number of accidents decrease etc. Employers – whether Government or private sector – however need to be convinced that short term investments to improve labour-conditions, can result in long term cost savings.

Improving and monitoring labour conditions is not easy and requires attention of governments, contractor organisations, and trade unions. Governments should set fair policies and laws in tripartite negotiations, and inspect their implementation. Inspection requires co-operation of employers' and workers' representatives, since labour and factory inspectorates in most African countries are not equipped to inspect all (small scale) enterprises, especially those in isolated areas. Contractor associations should represent the contractors, and assist in informing and training them about labour conditions and standards. Trade unions have the most difficult task: they should represent the workers, who are mostly temporary in labour-based works.

Notes:

1. *The ILO is currently preparing draft guidelines on labour management, conditions of work and labour standards. The draft guidelines will be presented and discussed during a formal tripartite meeting in Uganda on 6 and 7 October 1997.*
2. *ILO Conventions and Recommendations are available at ILO Headquarters and ILO/ASIST.*

ASIST URBAN



Africa is urbanising at a rapid pace, resulting in the increasing incidence of urban poverty. Most urban poor live in unplanned "squatter" settlements, characterised by poor or absent public infrastructure and services. Flooding, heaps of garbage, poor sanitation and poor access threaten their living and working conditions. Under- and unemployment are major problems and both are increasing at an alarming rate. Faced with the challenge, most city councils lack the capacity and resources to provide adequate shelter and services for all.

By adopting labour-based technology in infrastructure works in urban unplanned settlements, problems of poor infrastructure and unemployment can be addressed at the same time. City councils can further be

enabled in delivering services by contracting out infrastructure works to contractors and communities.

This labour and community-based approach has been piloted in various projects. In countries in English-speaking Africa, ILO/ASIST has been involved in pilot projects in Kenya, South Africa, Tanzania, Uganda, and Zambia. These projects have shown that labour- and community-based approaches can provide a sustainable contribution to urban poverty alleviation.

To promote the use of effective labour- and community-based methods to upgrade urban unplanned settlements, ASIST aims to develop and test methodologies in pilot projects, produce guidelines, provide advisory back-up to projects and policies and to provide information services and training.

More information: Wilma van Esch, Jan Fransen, ILO/ASIST, Nairobi.

ROADS FOR ACCESS

On 21 November 1996, 70 students and graduates participated in a workshop on "roads for access – finding appropriate solutions", which took place in London. The workshop was part of a series on "the developing engineer – engineering for 80% of the world", and was organised by the Association of London Graduates and Students (ALGS) and ICE Appropriate Development Panel (ADP).

The workshop looked into problems of the road sector in developing countries, problems of rural accessibility, and contractor development.

INFORMATION SERVICES FROM HARARE

The ASIST Information Services have expanded to our offices in Harare. You can now direct your queries to either of our offices in Nairobi or Harare.

ASIST ON THE INTERNET

By the time you read this, ASIST will have launched its new Web Site. For those of you connected to the Internet, you can find us on <http://iloasist.csir.co.za>

The development of this Web Site has been made possible through funding from Sida, and the work has been carried out by CSIR in Pretoria, South Africa.

BULLETIN 7

Bulletins 6 and 7 together aim to provide an overview of trends in labour-based tools and equipment. Both Bulletins are prepared in co-operation with the Management of Appropriate Road Technology (MART) Initiative.

Bulletin 7 will include articles on:

- Equipping contractors: what equipment to use and what are the issues
- Graders: appropriate equipment or not?
- A brief on soil testing equipment

- Appropriate compaction equipment
- Using soil stabilisers
- Hand-operated concrete mixers

We welcome your articles and information on your projects and programmes for inclusion in the Bulletin 7. The deadline, for the receipt of articles is the end of December 1997.

Bulletin 7 is expected in February 1998

Announcement: Regional Training Workshop on

MANAGEMENT OF LABOUR-BASED CONTRACTING IN ROADWORKS

12-23 January 1998, St. Lucia Training Centre in Harare, Zimbabwe

A number of countries in Africa, Asia and Latin America are now using or developing a small scale contracting capacity in the road sector, based on the use of labour methods. A range of issues and questions regarding management, procedures and documentation etc. require careful consideration and appropriate arrangements. This will help to develop an "enabling environment" and operational approach to encourage an effective, viable and sustainable small scale-contracting sector. Solutions should be developed based on consideration of international experiences and local circumstances. There is, therefore, a vital need for relevant information, discussion and guidance in this sector.

Target Audience

The training workshop is intended for **planners and implementers**, principally from Sub-Saharan Africa, who are or will be involved with **labour-based contract management and administration** or **contractor development** in the region, e.g. contract managers and supervisors from the client organisations or their representatives (consultants), contracting development planners and decisions makers for labour-based roadworks. However, English speaking participants from other regions will also be welcome.

THE WORKSHOP

The two-week problem-solution oriented training workshop will provide a forum where the latest developments on contractor projects are presented and discussed, where information on relevant topics is provided and where participants have the opportunity to develop conclusions and approaches for their specific projects with the assistance of experts in this field.

ORGANISATION

The workshop is being organised by leading Consulting Engineers in the sector; Intech Associates, in association with the Department of Roads, Zimbabwe. Organisational Training & Development (Pty) Ltd, Zimbabwe will be co-organisers of the workshop.

FURTHER DETAILS

The training workshop fee will be US\$ 3,900 to include all tuition, materials, documentation, accommodation, meals, site visits and local transport, including all travel arrangements over the weekend midway through the training workshop.

For more information, please write to: Intech Associates, c/o Monica Dombo,

P.O. Box BE 1206, Belvedere, Harare, Zimbabwe,

e-mail: rob@intech-consult.demon.co.uk, or abeusch@spin.ch

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MART NEWS

The Management of Appropriate Road Technology (MART) Initiative has just entered the final year of its initial three year funding. All the project partners (Loughborough University, Intech Associates and IT Transport) are finalising working papers from work carried out in their respective fields. It is anticipated that working papers 1 to 10 will be available for distribution at the Regional Seminar for Labour-based practitioners in Uganda. In addition, a number of conference and journal papers and the book "Labour Based Roadworks: A state of the art review" should also be available in October.

The MART team has commenced the preparation of the 3 sets of guidelines that will be available next year:

1. Rules for Roads: Towards a sustainable market for labour-based road contracting
2. Intermediate Equipment Handbook (Vols. 1 & 2)
3. Guidelines on Handtools for Construction

The World Road Association (known as PIARC) has expressed an interest in publishing the guidelines, which will enable the manuscripts to be translated and published in French and Spanish in addition to English.

MART Initiatives' findings have been presented at the World Bank International Workshop on Rural Infrastructure, and MART has organised two seminars at the Institute of Civil Engineers (ICE) in London. The first seminar, Roads for Access, was attended by students and graduate engineers from Universities and civil engineering organisations. The second seminar, hosted by the Appropriate Development Panel, included presentations from a low income country road engineer, and from the Department for International Development (DFID), formerly (ODA). The objective of the seminar was to review previous work that has been carried out and to discuss the 'way ahead' in association with donors and recipients.

During the initial phase of the MART Initiative, the lack of well-documented information on the planning, construction and maintenance of road structures such as bridges and culverts has been highlighted. DFID has therefore financed further work that will be carried out under the MART initiative to prepare a practical planning and construction guide for road structures. This is a 2 1/2 year project which aims to publish the guide in the summer of 1999. Work is also progressing on a related research project on the development of tractor-owning contractors. This project includes co-operation with private sector companies through the Commonwealth Development Corporation (CDC).

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RURAL TRAVEL AND TRANSPORT IN ZIMBABWE

by *Fatemeh Ali-Nejadfard*, Rural Travel and Transport Adviser, ILO/ASIST, Harare

Introduction

The new component of the ASIST programme on Rural Travel and Transport (RTT) was introduced in the News Section of the previous issue of the ASIST Bulletin. The programme works closely with governments, NGO's and donors in the Southern Region of Africa to address Rural Accessibility issues. This article introduces the process through which the RTT is addressed in countries where the governments have requested our technical assistance. Here is a brief introduction of RTT case of Zimbabwe and the process of : a) identifying rural access problems, b) raising awareness by sharing the gathered information at the national level, c) demonstrating how the access problems can be addressed at the local level and d) how to facilitate development of a national transport policy that is inclusive of the key RTT issues.



What is the pattern of Rural Travel and Transport in Zimbabwe?

The Transport policy in Zimbabwe has its focus on the provision and the improvement of roads in rural areas for motorised transport and on the formal road network. This approach pays little attention to the access problems that rural households face in addressing their daily basic needs.

A study on the pattern of RTT was commissioned to a national consultancy firm by the Ministry of Transport and Energy, with funding from the Swedish International Development Co-operation Agency (Sida), in collaboration with ILO/SAMAT and ILO/ASIST in Harare. The study was carried out in three districts of Zimbabwe, targeting three wards in each district and focusing on eight villages in each. The Rural Transport Study (RTS) focused on the travel and transport burden on the rural households. The findings of the RTS depicted the following pattern of RTT in Zimbabwe:

- The availability of formal roads does not appear to be a major factor in determining rural travel and transport patterns and improved level of accessibility. Access to services appears to be a more significant factor.
- The basic need for transport and travel is focused around and within villages. An average Rural Household spends between 60 and 70 hours per week to get access to water, collect firewood, go to a grinding mill, get to a clinic, market its produce and have its children in school. This does not include the average 17 hours per week wasted by members of a rural household on waiting in line to get access to its different needs. The dominant mode of transport is walking and head loading:

77% of which is borne by women.

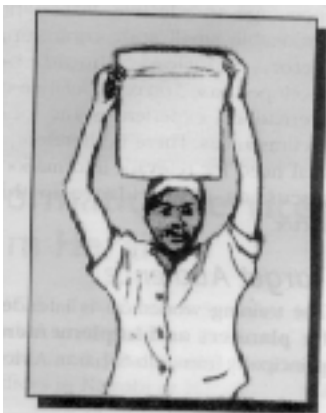
- Female members of a rural household spend 2 to 3 hours carrying 25 litres of water every day and an additional 2 hours waiting to get it. An average of 2½ hours every two days is spent in collecting heavy fuelwood. The round trip to health clinics is very time consuming; taking an average of 3 hours per visit (not including the waiting time to get services).
- Walking is the usual way to get to school with distances ranging from 2 to 7 km. The participation of girls in secondary schools drops significantly below that of boys. This trend is more significant in the remote villages away from the service centres.
- The difficulties in access are attributed to poor rural infrastructure, location of the needed services and limited or lack of access to non-motorised means of transport known as the Intermediate Means of Transport (IMT). Among those who own IMT's wheelbarrows are the most common and donkeys the least. There seems to be hardly any use of the available transport means for the subsistence needs of the household. Considerable numbers of existing IMT's are not in working condition due to poor maintenance services, lack of available or not affordable spare parts.
- One of the most important outcomes of the RTS has been the application of a planning tool in the target districts that identifies the access problems at the local level and in collaboration with the communities, and that draws a prioritised list of interventions that can address the identified problems.

The RTS results indicated how the difficulty in access adversely affects the effectiveness of services to reach communities. It adds to "isolation" of the rural household and cuts its opportunities to better education, better health facilities, better job opportunities, better markets and better income.

Raising Awareness of RTT at the National Level

The RTS in Zimbabwe culminated in a National Seminar on RTT where the line ministries, NGOs Rural District Councils and donors were gathered to discuss the outcomes of this study and to consider its recommendations.

Demonstrations of Access Interventions



While it was demonstrated in target districts how accessibility planning can help the local planner to identify access problems and plan its interventions, there was a need to demonstrate how access interventions can reduce the burden of travel and transport on rural households. These interventions include improvement of paths, tracks, construction of foot-bridges, facilitating availability and purchase of IMTs, improved transport services/maintenance and improved ovens that reduce the need for fuelwood, among others.

In view of the above, Sida has funded a government's proposal to implement, in collaboration with the ILO's technical support, some of the identified interventions in target districts. This is to be implemented soon in collaboration with the communities, local NGOs and the government at the local level

RTT Policy Initiative

Pilot projects may not have a chance to be widely spread if policy support is absent at the national level. Serious efforts are being made to work closely with the relevant ministries in Zimbabwe to facilitate the development of a transport policy that includes key issues on RTT.

Rural Accessibility and Poverty

Improving access through improved rural infrastructure, better mobility, a more accessible location of facilities, better mobility, better IMTs maintenance, or other interventions that reduce the need for travel and transport, would substantially cut the wasted time that the rural household spends on getting access to their basic needs. There would be additional time available to rural women, children and men; making use of the saved time, adding to their welfare, reducing their isolation and having better access to economic opportunities that would contribute to improved living conditions for rural households.

Future News on RTT

The next ASIST Bulletin will carry information on other initiatives regarding RTT in the region. If you have any questions on RTT issues, please write to ILO/ASIST Harare

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MEASURING HUMAN DEVELOPMENT AND POVERTY

Human Development Report, UNDP, 1997

By Jan Franse, ILO/ASIST, Nairobi

Human Development Index (HDI)

The 1997 Human Development Report by UNDP defines human development as the process of enlarging people's choice. The most critical facets of human development are to live a long and healthy life, to be educated and to enjoy a decent standard of living. These are translated into a live expectancy index, education index and Gross Domestic Product (GDP) index, which together make the Human Development Index (HDI). HDI is quoted between 1 (excellent) and 0 (not developed).

Out of 175 countries, Canada has the highest HDI score (0.960), and Sierra Leone the lowest (0.176). The ASIST core countries fall far below the world average, and most are far below the average of the least developed countries. South Africa is doing best, while Ethiopia, Eritrea, and Mozambique accompany Sierra Leone among the 10 least developed countries of the world.

Human Poverty Index (HPI)

The HPI focuses on the situation and progress of the most deprived people in a community, and gives the percentage of people living in poverty. HPI measures:

- **Longevity** – percentage of people expected to die before age 40
- **Knowledge** – percentage of adults who are illiterate
- **Living standard** – percentage of people without access to health facilities and safe water, and the percentage of malnourished children under five

The HPI is only given for 78 developing countries, with Trinidad and Tobago on top (4.1% poor) and Niger with the highest percentage of poor (66.0%) . Most ASIST core countries have 1/3rd of their inhabitants living in poverty; for Mozambique, Ethiopia, and Sierra Leone it is more than half. Zimbabwe has 'only' 17% of poor, which is remarkable considering its low development ranking. It proves once again that development and poverty alleviation do not necessarily go hand in hand. Poverty alleviation requires targeted policies, such as education and health care for the poor and employment creation policies .

Human Development Index and Human Poverty Index

	HDI Ranking*	HDI Value	HPI Ranking**	HPI Value
South Africa	90	0.716	-	-
Botswana	97	0.673	29	22.9%
Egypt	109	0.614	44	34.8
Swaziland	114	0.582	-	--
Namibia	118	0.570	59	45.1
Zimbabwe	129	0.513	17	17.3
Ghana	132	0.468	43	32.6
Kenya	134	0.463	32	26.1
Lesotho	137	0.457	35	27.5
Nigeria	141	0.394	54	41.6
Zambia	143	0.369	45	35.1
Tanzania	149	0.357	50	39.7
Angola	157	0.335	-	-
Sudan	158	0.333	57	42.3
Uganda	159	0.329	53	41.3
Malawi	161	0.320	60	45.8
Mozambique	166	0.281	72	50.1
Eritrea	168	0.269		
Ethiopia	170	0.244	75	56.2
Sierra Leone	175	0.176	77	59.2
Somalia	-	-	-	-

*HDI = Human Development Index, given for 175 countries

**HPI = Human Poverty Index, given for 78 developing countries

Source: Human Development Report 1997, UNDP

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PROJECT NEWS

Eritrea

At the request of the International Development Agency (IDA), ILO has fielded two missions to provide assistance to the Eritrean Community Development Fund (ECDF) in the development of a training programme for the proposed labour-based rural roads maintenance and rehabilitation project

The project will be implemented by the Engineering Department of the Ministry of Local Government and will concentrate on rehabilitation, spot improvement and maintenance of existing roads.

Osei-Bonsu, ILO/EAMAT, P.O. Box 2532 Addis Ababa, Ethiopia

Ethiopia

Italian project

The long awaited Italian funded and ILO executed road rehabilitation project in Tigray and Amhara regions became operational by the end of June 1997. The project entails the rehabilitation of three roads totalling 87 km and the training of technical and management staff of the Rural Roads Authority (RRA) in the two regions.

Mr. Italo Boeri is expected to be approved as the Chief Technical Adviser and he will work closely with a National Professional Staff and the RRA in executing the project.

Sida Project

The rehabilitation of the 33 km Grugufu Gimba road is nearing completion. The two HIFAB Technical Advisors will be leaving the project at the end of May.

A new agreement between Sida and Amhara National Regional State for a three year food security programme was recently signed. Under this agreement, labour-based activities are to be expanded to cover four administrative districts. A Technical Adviser is to be recruited to assist the Rural Roads Authority in the implementation of the expanded activities.

Osei-Bonsu, ILO/EAMAT, P.O. Box 2532, Addis Ababa, Ethiopia

KENYA

DANIDA projects

The DANIDA projects in Nyanza and Coast Provinces of the Minor Roads Programme (MRP) were

evaluated in June 1997. The projects have been successful in rehabilitating a total of about 800 km and maintaining about 3000 km of feeder road, and the technical standards were found to be adequate. The evaluation team noted that only 20% of the workforce were women, and advised Roads 2000 to take practical measures if the percentage is to be increased. Roads 2000 may also aim to integrate road planning to a greater extent in the social and economic planning of the districts.

Kisii Training Centre has trained all staff, and a total of 1214 participants have been sent to 234 courses.

DANIDA has in principle agreed to support the Roads 2000 approach. Considering the transition from the MRP to Roads 2000, the team listed some issues to address: (1) contracting out has implications for training, organisation, and administration; (2) network planning requires integrated planning at district level; (3) the MRP structure must be integrated in the Ministry; and (4) mechanical workshops set up under MRP must be reconsidered.

Jan Fransen, ILO/ASIST, Nairobi

MOZAMBIQUE

In 1996, 587 kilometres of road were rehabilitated. This was highest in the history of the Feeder Roads Project (FRP), despite heavy rains early in the year closing down operations for a while and severe cash flow problems in the second half of the year due to late payment of certified invoices and subsequent non-payment of workers salaries.

There are currently 29 brigades operational with a further 6 mobilising brigades (4 rehabilitation and 2 maintenance). Support is secured for a further 2 contractor development brigades with another 9 units under consideration by donors.

Previous ASDI (Sida) and UNDP supported projects terminated at the end of 1996. However, new project activities have been proposed from 1997 onwards, involving a phased transition from rehabilitation to maintenance of rural roads. New projects have become operational for the period 1997-1999. These projects are: MOZ/96/013-Management Assistance to Labour-based Feeder Roads Programme (50% ASDI/UNDP cost sharing) and Swedish Support to the Roads Sector in Mozambique (ASDI funding). The UNCDF projects MOZ/89/CO2 (Nampula Province) and MOZ/89/CO4 (Zambezia Province) continue.

John Clifton, CTA, c/o UNDP, P.O. Box 4595, Maputo, Mozambique

SUDAN

United Nations Capital Development Fund (UNCDF) is to fund the construction

Of an 86 km road using labour-based methods to link Idd El Fursan to Nyala in the Southern Darfur State. Over 40 Irish crossings will be required on the road of which 13 have bottom structure lengths ranging from 20-200 metres.

The project, valued at US\$5.5 million over 3 years, is expected to be operational in September and it seeks to establish a capacity within the private sector construction industry capable of undertaking road rehabilitation and maintenance.

Five small-medium sized contractors are to be selected to undergo a twenty week comprehensive

training programme involving classroom and site works including the construction of 11 km model road.

The project is to be implemented by the State Ministry of Engineering Affairs while the execution will be entrusted to local engineering company. ILO will engage the services of a Chief Technical Advisor and a Training Advisor to assist the engineering company in executing the project activities.

Osei-Bonsu, ILO/EAMAT, P.O. Box 2532, Addis Ababa, Ethiopia

UGANDA

Transport Rehabilitation Project-Feeder Roads Component

The training of contractors has been completed and 12 contractors out of 14 have been pre-qualified for full-scale rehabilitation contracts with a value ranging from US\$ 150,000 to 320,000 which are to commence mid 1997. Equipment worth US\$ 1.6 million has been purchased with the package per contractor worth from US\$ 130,000 to 150,000.

A model for leasing the equipment to the contractors has been developed. The recommended option is a finance lease (lease to own) administered by a local bank for a lease management fee of US\$ 155,000 over a period of 48 months. The project team will have a monitoring and advisory role in the leasing scheme on the technical aspects, such as performance of the contractors and maintenance of the equipment.

The project concluded that the Petty Contractor system for routine maintenance, which was originally developed by the Ministry of Works, needed further development in order to be manageable by district administrations with limited resources in terms of staff and transport. Subsequently 24 Routine Maintenance Contractors have so far been trained to maintain from 20 km upwards. This will make it more attractive to the contractors to establish themselves as professional firms and will ease the burden on the districts for supervision and contract management.

It has been resolved to adopt ROMAPS (Routine Maintenance Planning System) which has been developed by Roughton International, as the planning and budgeting system for all districts and to facilitate better planning and monitoring at the Ministry of Local Government. The system, which can be operated manually or computerised, is being modified.

Following a seminar on training in January 1997 held at Mt. Elgon training centre, more interest has been shown by other projects and districts in utilising the training facilities and capacity that has been established. More efforts are however needed to harmonise standards and specifications and to arrive at a common approach to Labour-Based/Light Equipment-Supported rehabilitation and maintenance in general and training in particular. It is believed that this effort will gain momentum with the arrival of the Transport Planner to strengthen the Engineering Desk and the recent employment of a training co-ordinator in MOLG

Jon Hongve, Norconsult, P.O. Box 2237, Mbale, Uganda

ZAMBIA

Roads Training School

Labour-based contracting is really taking off in Zambia, as a result of a successful promotion campaign

of labour-based methods at policy and implementation levels. We are now counting the following stakeholders as our clients: Ministry of Works and Supply, Ministry of Local Government and Housing, Ministry of Agriculture, Food and Fisheries, NGOs, Municipal Councils and District Councils, Road works carried out by the above mentioned organisations are funded by various multilateral and bilateral agencies.

The services provided by Roads Training School to the above-mentioned clients have been in the form of contractor training (maintenance and rehabilitation), as well as training of contract supervisors, seminars and workshops in contract management and advisory support in writing up Contract Agreements including, preparation of Specifications, Bills of Quantities and monitoring.

The first batch of rehabilitation contractors completed their formal training (5 months) at the Roads Training School in mid April this year and have now returned to Eastern Province to embark on 6 months of trial contracts, followed by a 12 months mentorship period. We have also earlier trained 14 Contract Supervisors and 21 Maintenance Contractors for the same project which operates under the auspices of Ministry of Local Government and Housing supported by UNDP/UNCDF and managed by ILO.

In all the nine provinces of Zambia, Provincial Road Engineers (who are our main target group) have or are about to commence routine maintenance by contract account using labour-based contractors. Many of the maintenance contractors have not yet been trained by Roads Training School, but we are supporting their operations through advisory support to the Provincial Road Engineers. Roads Training School has also developed appropriate light equipment for road works, like tractor-towed compaction rollers.

In respect of financing of roads in Zambia, a World Bank supported Road Sector Investment Programme (ROADSIP) was sanctioned by the Zambian Government during the first quarter of this year and is now being launched. The size of the investment is about 1 billion US Dollars over 10 years. This sum includes also bilateral Donor funding, as it is planned that ROADSIIP should encompass an co-ordinate all road investments in Zambia, whether multilateral or bilateral through a strengthened National Roads Board in the interim, before reforms have paved the way for a single semi-autonomous road authority to take over around year 2000.

Carl-Eric Hestrom, Roads Training School, P.O. Box 30918, Lusaka, Zambia.

Zambia Agricultural Marketing and Processing Infrastructure Project (ZAMPIP)

ZAMPIP is funded by the Government of the Republic of Zambia and the International Development Association (IDA) of the World Bank to stimulate and support private sector participation in agricultural production and marketing in primarily three of the nine provinces.

The project is being implemented by the Ministry of Agriculture, Food and Fisheries. However, because the Highway Authority for feeder roads is the Ministry of Local Government and Housing there is close liaison between these two Ministries. The Project Engineer is base at the Ministry of Local Government and Housing under the Department of Infrastructure and Support Services-Feeder Roads Unit.

The project was programmed to deliver 1,000 kilometres of feeder roads using labour-based

rehabilitation contractors. Of these 500 kilometres were to be done under 'Emergency Repairs' intended to provide access for the transportation of the bumper maize crop of 1992/93. Due to the urgent nature of the 'Emergency Repairs' and the lack of labour-based contractors at the time, the first phase of the project was done by relatively large equipment-based contractors, some with international connections. This phase is virtually complete and the second phase is about to commence. It has in the meantime been decided that the project should be extended to all the nine provinces to take advantage of the unique local conditions of each.

For phase two the project intends to train and equip 6 labour-based rehabilitation contractors in three provinces. This is being done through the Roads Training School of the Ministry of Works and Supply, and the training programme commenced by end of June. Applications have already been received by the project. A tremendous response has been recorded although it remains to be seen just how many of the applicants meet the selection criteria.

The rehabilitation contractors would be expected to deliver about 20 kilometres each by the end of 1998. The project will provide support until 1999 after which the Road Sector Investment Programme will take over.

The project also intends to train between 25 and 30 labour-based maintenance contractors through the Roads Training School and the two Ministries are about to sign the "Training Agreement/Contract". These contractors will be based in the districts where the project has rehabilitated some roads. The participating district councils have been designated as centres for the identification of suitable candidates who are to be selected through public open advertisements. Initially 10 districts are involved but this is expected to increase with the expansion of the project area.

Peter Lubambo, Project Engineer, ZAMPIP, Ministry of Local Government and Housing. P.O. Box 35281, Lusaka, Zambia

ZIMBABWE

Labour-based contractor development project

The Contractor development project in Zimbabwe formally commenced in January 1997, and will run for 2½ years with a total estimated cost of US\$ 22 million.

The project has four components:

Rehabilitation. The first eight rehabilitation contractors are expected to start working in August 1997, and a second batch in July, 1998. Then, the existing four force account units will be phased out.

Maintenance. Preparations are under way to introduce a one-man contractor system of maintenance on all rehabilitated feeder roads. The first 20 petty contractors will start training mid-June 1997, and start actual maintenance work by August 1997.

Training. Training of 10 contractors and 40 supervisors started in February 1997. The managers are trained for 7 weeks, mainly in business administration and management techniques. The contractor's supervisory staff are trained on technical aspects in classroom sessions, (5 weeks), and practicals, (8 weeks). Staff of the Department of Roads will be trained as well.

Equipping contractors. A loan system has been set up and equipment agreed upon, based on a five year repayment period. All contractors that successfully completed their training will be equipped.

Project staff has changed: Htun. Hlaing has replaced U. Bruderfors as training specialist and C. Makoriwa has joined as construction specialist. A. Kidanu continues as programme adviser and P. Jemwa as maintenance superintendent.

Afsaw Kidanu, Programme Adviser, LBDU, Box CY263, Harare, Zimbabwe

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ASIST

ADVISORY SUPPORT INFORMATION SERVICES AND TRAINING FOR LABOUR BASED PRACTITIONERS

A Programme executed by the Employment-Intensive Investment Branch (EMP/INVEST) of the ILO

[Asist Bulletin no. 6,](#)

September 1997

SIXTH REGIONAL SEMINAR FOR LABOUR-BASED PRACTITIONERS

29 September – 3 October, Jinja, Uganda

By Ben Ssebugga, Ministry of Works, Transport, and Communications

ILO/ASIST has in the past sponsored five successful Regional Seminars, where labour-based experts from Sub-Saharan Africa and beyond have met to review the developments in labour-based technology. This event, which is held annually in different countries, will this year take place in Uganda. The total number of participants is expected to be about 120. The seminar is hosted by the Ministry of Works, Transport, and Communications, Uganda, in collaboration with ILO/ASIST.

Labour-based works in Uganda

Uganda has been involved in labour-based technology since before independence. Several roads were constructed and maintained using labour-based technology. However, the focused use of this type of technology started after the Road Maintenance Initiative drive, which was introduced in 1989. The bulk of routine road maintenance is now being implemented with labour-based technology. The field visit during the seminar will give participants an opportunity to see these achievements themselves.

Uganda also has piloted urban, community-based infrastructure.

The right tool for the job

The theme of this seminar is "The right tool for the job – review of tools and equipment for labour-based infrastructure work". The seminar will include papers presented by experts and followed by discussions led by a panel. Topics to be discussed include:

- What is the best and cheapest haulage equipment?
- What equipment is needed to rehabilitate and maintain surfaced roads and paths?
- What is the best and most up-to-date method of compaction?
- How can we better manage handtools?
- How can we procure equipment more efficiently?

Demonstrations, exhibition, field visit

On Wednesday, 1 October, the participants will visit contractor roadworks of the Uganda Transport Rehabilitation Project and their training school. Various tools and equipment will be exhibited and demonstrated (graders, rollers, handtools, templates, culverts, etc.). Hyson Cells, a labour-based technology to construct concrete pavings, embankments, and dams, will be demonstrated.

Further details

The seminar fee will be US\$ 350 for participants from Uganda. This covers all tuition, course material, proceedings, lunches, transport within Uganda, and two cocktails.

More information: William Musumba, Ministry of Works, Transport, and Communications, P.O. Box 10, Entebbe, Uganda,

Tel + 256 42 20125, Fax + 256 42 20135, e-mail: twins@imul.com; or

Jan Fransen, ILO/ASIST, Nairobi.

EXHIBITION AND DEMONSTRATIONS

The Regional Seminar includes an exhibition and demonstration, among others, on Hyson Cells. Hyson Cells are a technology that can be used to construct concrete surfaced roads and paths, embankments, and dams, using labour-based technology. In South Africa, the technology has been piloted in various projects, implemented by small-scale labour-based contractors and communities. Experience suggests that the technology is easy to use.

Hyson Cells are a mat comprising a series of square cells, that can be filled with grouted stone or cement. The paving functions as both a wearing surface and the road foundation. The stone can be placed by hand and the grout manually mixed and placed. The technology is not cheap, but may be suitable for steep slopes, roads and paths with heavy traffic, et cetera. Due to the interlock system, theft of stones is minimised and surface wear is considered to be low.

During the Regional Seminar for Labour-based practitioners, Hyson Cells will be introduced with a slide show, and a demonstration, in which a 50 m surface will be laid.

New ASIST Nairobi Numbers

Please note that the telephone numbers of ASIST Nairobi have changed.

The new numbers are:

TELEPHONE: + 254 2 572555

+ 254 2 572580

FAX: + 254 2 566234

E-MAIL: iloasist@arcc.or.ke

The Telex is no longer being used.

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