CTP 70

WORLD EMPLOYMENT PROGRAMME

GHANA
FEEDER ROADS IMPROVEMENT AND MAINTENANCE BY CONTRACT

Summary of Training Needs Survey and Proposal for the Training at Wiawso of Contractors' and DFR Staff

by

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1 Introduction and Summary of Findings

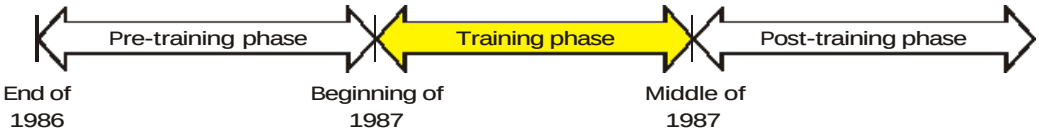
This report outlines training proposals for the feeder roads component of the World Bank/UNDP financed Fourth Highway Project in Ghana. These proposals encompass training related to contractors as well as DFR personnel, who in different capacities will become involved with the project. It focuses particularly on the organisation of the training on the pilot demonstration site in Sefwi-Wiawso District. It is the result of a two week mission to Ghana undertaken in April 1986 during which a training needs survey was conducted of DFR staff, contractors and site agents in Accra, Takoradi and Wiawso.

The report highlights issues relating to the training programme which should be discussed by the persons to be involved. The recommendations should be regarded as a general framework from which a detailed training programme can be developed.

The training programme in Wiawso is scheduled to start in the beginning of 1987. Expected duration is about 5-6 months during which staff from participating contractors and DFR will receive class-room and on-site training.

The categories of personnel to be trained, are contractors, supervisors, foremen, accountants, storekeepers, timekeepers, mechanics and operators.

For the purpose of this report, the work connected with the training is divided into three phases, as follows:



The pre-training is expected to run from August '86 till January '87. During this phase, a detailed outline of the methodology and programme for the training will be prepared, together with the material to be used during the training. This work will require the assistance of training specialists, both in the training of contractors and supervisors for labour-based road construction and maintenance. The GHA (Ghana Highways Authority) trainer to be attached to the team should be actively involved in this work.

The training phase will be in two parts; setting up and running a demonstration site (1) and carrying out the main training programme (2). Part 1 will last around 1 1/2 months and will include a week's class-room training of a group of selected DFR staff who are going to run the demonstration site. When the main training programme starts, they will join the other trainees for in-depth training. Part 2 of the training phase, which will last 4 1/2 months, will constitute the main training programme. A mixture of class-room and on-site training will be provided throughout the training phase.

A variety of methods will be used to enable trainees to effectively learn the necessary skills in the class-room, then apply them on-site under guidance and then review their-own performance. The class-room training should be done by a training specialist and the GHA trainer. It is assumed that the GHA person will have some experience in instructional technology. It may be advantageous to attach a DFR person to the training team, in which case he may require training in instructional technology. The necessity of such training should be assessed for both the GHA and the DFR person. On site, the guidance and performance monitoring will be done by the DFR project engineers and the expatriate staff. It is recommended that the BHC

(Bank for Housing and Construction) is involved in the training on financial topics. Training in plant maintenance should be discussed with the Plant Pool.

A training centre is going to be constructed in Wiawso. The centre should be built in such a way that 30-40 trainees can be comfortably seated a during 8-9 hours of intensive class-room training. It should also contain the necessary teaching aids.

In addition to standard teaching aids, it is recommended that scale models of the sites and video equipment are used in the training. There will be a need for accommodation of trainees and members of the training team, which will have to be provided during the pre-training phase and the training phase.

In the post-training phase, a final version of the training material and a guide for the organisation of such training programmes should be prepared. A forum for further support and upgrading of the trainees should also be instituted.

Section 8 lists the budget items required for the programme.

2 Summary of the Survey

The survey was mainly conducted in three places:

Accra - Interviews with DFR regional and district engineers
Takoradi - Interviews with contractors and site agents
Wiawso - Interviews with contractors and site agents

The interviews with DFR staff revealed what they thought their supervisors and foremen should be trained in to enable them to successfully undertake labour-based road projects. The following topics were suggested:

Supervisors
- Planning - Estimating - Programming - Surveying - Human relations - Unit costing - Reporting - Cost control - Productivity

Foremen
- Work organisation - Surveying - Soil mechanics - Concrete technology - Reporting - Daily programming - Book-keeping - Construction of wooden bridges - Reading drawings - Calculation of volumes - Inventory control

It was also suggested that the foremen should be given the opportunity of a refresher course in arithmetic. This will be included in "calculation of volumes" in the curriculum. It was concluded that none of the participants will have problems with reading or expressing themselves in English.

In Takoradi, a group of 11 contractors and site agents was interviewed. First, a brainstorm session defined the skills which they thought were crucial for a road contractor to have in his company in order to be successful with regard to quality of work, meeting target dates and making a profit. They were asked to think of past successful projects, undertaken either by themselves or others and the particular skills which had made them successful. A visual presentation illustrated the factors that comprise the management of road construction. The following skills were suggested:

Skills necessary for the company to be successful:

- Proper planning of labour, finance, materials and time
- Project meetings with the staff
- Get finance
- Ensure availability of materials, equipment and labour
- Selection of supervisors and incentives
- Correct choice of materials and equipment
- Proper motivation of workers, human relations
- Financial planning
- Obtain head office services in an economic way
- Know the unit cost
- Proper maintenance of equipment

Skills which they think will be important when executing labour-based contracts:

- Work organisation
- How to deal with transportation and housing
- Use of incentives
- Inventory control
- System of time keeping
- Book-keeping

Following the discussion, each contractor was requested to comment on the extent to which training in the above skill was needed in his company and who would need it. The responses served to analyse what skills are necessary for the various staff in their companies.

Each contractor also filled in a form describing the staff in his company - their responsibilities and qualifications. These staff forms revealed that about 50% of their supervisors and foremen have a "City and Guild" as minimum education. A "City and Guild" lies at polytechnical level. The other half have GCE 0-level as minimum education.

The contractors and site agents in Wiawso were interviewed in a similar way, but relating more specifically to the skills listed by those in Takoradi.

In addition to the information which was recorded in a structured way, qualifying statements were noted which were made during the sessions, such as:

"The problem is sometimes unclear instructions";
"I want to know how my site engineer arrives at his estimates";
"Some contractors deal with their workers in a very demoralising way".

A meeting with the Chief of the technical division in the Bank for Housing and Construction (BHC) further revealed that contractors wanting to obtain loans will have to keep certain financial records to make them eligible for loans.

In addition to the responses from those interviewed, the experience of the reporter and other members of the mission have been used to set up the proposed curricula in Section 4.4.

The Ghana Highways Authority (GHA) - Training Section

The GHA is the body within the Ministry of Roads and Highways (MRH) which is responsible for training of the staff who comes under the Ministry. It has a training section which is staffed by 3 professionals. Over the years the section has developed and used audio-visual aids and training manuals at seminars in different aspects of road construction. In addition, they have run seminars on book-keeping for their own staff and maintenance of plant. They have carried out training needs surveys of their

staff, and employed different training methods at their seminars. The Head of the Section, Mr. Adoo, has expressed his willingness to allocate one of his staff for a 6 month period to this project to assist with the training. This person would assist with the preparation and implementation of the training programme.

The Bank for Housing and Construction (BHC)

A meeting was held with the Chief of Engineering Services, Mr. Amadu. In relation to the project training, he observed that BHC will require the contractors to maintain their books and keep certain records of their transactions. Hence, the keeping of books and records in accordance with BHC requirements should form part of the curricula.

The Plant Pool

Mr. H.M. Minski, Chief Service Manager of the Plant Pool, stated that Plant Pool might be willing to participate in on-the-job training of mechanics. This should be taken up with the Managing Director of the Plant Pool before a decision is made on training in repair and maintenance of equipment.

3 Pre-training Phase

3.1 General

Since this is the first time the programme is run and it has to succeed the first time, thorough preparation is vital. Therefore, in addition to preparing the various parties involved, the training specialist, the expatriate project staff, DFR and GHA should liaise closely from the outset of the project concerning the activities to be carried out before the training phase.

3.2 Preparatory work by the training specialist

(a) Finalise the methods and curricula suggested in this report with DFR, GHA, the CTA and the expatriate project staff.

(b) Identify sources of training material[1] for the different topics listed in the curricula in 4.4 below and make an assessment of the extent to which existing material has to be modified and new material written. A staff on the ILO's Construction Management programme will, by August, have prepared a detailed outline of the material to be prepared for the contractors on how to manage a road construction firm.

(c) Prepare material for the class-room training for the technical topics on labour-based technology. The technical topics on labour-based technology are largely covered by the existing supervisory training modules. The work involved will mainly be to adapt this material to suit the conditions and procedures prevailing in Ghana and to outline the methodology of the training in these topics. The topics which are more related to company management and overall project management will require collation of special material. This material should be a brief, illustrative presentation of the basic principles and how they are applied. Some exercises may be supplied, but the transformation from theory into a practical skill will mainly be done by applying the theory to the management of the test road.

[1] Some sources that are likely to be useful are "Guide to the Training of Supervisors for Labour-based Road Construction and maintenance" (ILO) and "Modules of Employable Skills" (ILO) (for concrete technology and mechanical skills), "Training modules for the training of building contractors" (ILO) and the video film produced for the ILO in Thailand on labour-based methods.

(d) Prepare a plan for the methodology of training both on the test road and for the various topics in the class-room, outlining the purpose and mechanism of the method, the inputs required from the members of the project team and the training aids to be used.

(e) Prepare an introductory training programme for DFR supervisors who are going to start the demonstration site before the main training begins and run it until the trainees are capable of running it themselves.

The duration of this work is expected to be around three months.

3.3 GHA involvement

From the outset of the pre-training phase the GHA Training Department Representative attached to the project should work with the training specialist and preferably be given some responsibility in the preparatory work for the training. This form of on-the-job training should provide him with the necessary insight into the training procedures to be adopted by the project. Although a number of DFR engineers will take part in the training, they will be spending a lot of their time supervising and monitoring work on the test site and will only have limited time to study the pedagogical mechanisms at work.

It is assumed that the person selected will already have experience in instructional design and possess good understanding of various training methods in the class-room as well as on-the-job training and that he will be instrumental in the replication of the training methodology and contents.

3.4 Co-ordination with participating contractors

It is vital for any successful training programme that the participants know what will be required of them and what they can expect at the end of it. It is perhaps even more so with this one, since it represents a significant investment for the contractors to be without four of their staff for 4-5 months and also be away themselves for some time to attend training.

It is anticipated that at least some of the participating firms will have on-going work during the training programme. Therefore, they should be presented with a detailed timetable of the programme so that they can make arrangements well in advance for other activities they might have. It is likely that the timetable will change as the programme proceeds. Up-dated versions should then be given to the firms, preferably on a monthly basis. This information also enables staff in the firms to opt for parts of the programme which they are not required to attend, but which they find useful.

The division of responsibilities may vary considerably from one firm to the next. For example, in firm A two functions may be carried out by two persons, but in firm B they are both executed by the same person. This difference in company structure may affect the timetable and should be taken into account when the final timetable is prepared.

4 Training Phase

4.1 General

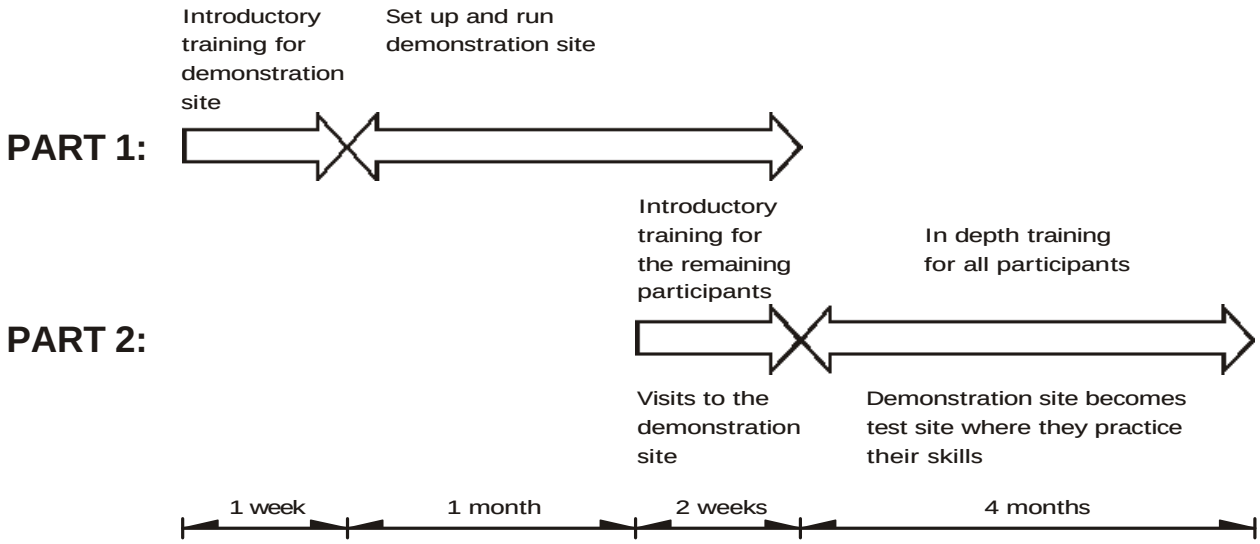
Following the training phase, the participating DFR staff and contracting firms should possess the necessary skills to successfully plan and execute labour-based road construction and maintenance.

The training phase can be divided into two parts:

PART 1 - Set up and run demonstration site. Give introductory training to a group of selected DFR supervisors and foremen to enable them to run the site together with DFR project engineers and expatriate engineers.

PART 2 - Train all participants in the skills pertaining to their respective functions in labour-based road maintenance. Set up a test site on which they apply the skills learned in the class-room and where they receive on-the-job training.

In a diagrammatic form this can be shown as follows:

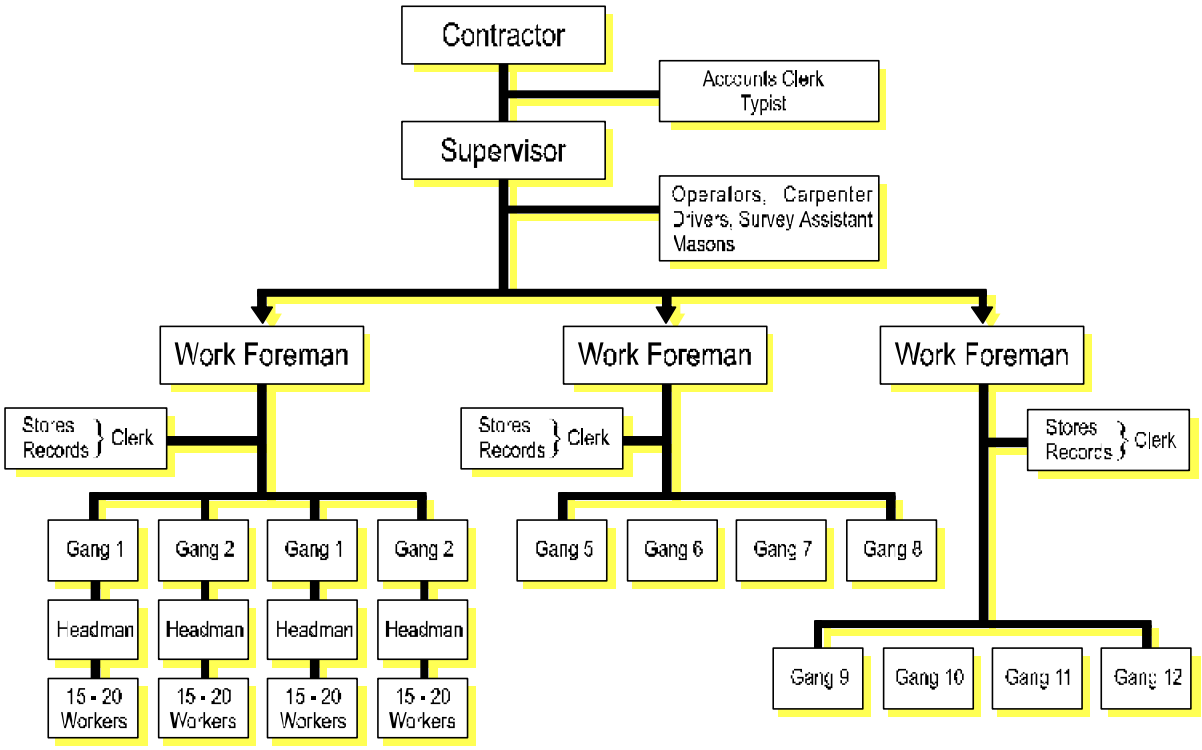


4.2 Participation

The expected distribution of participants is as follows:

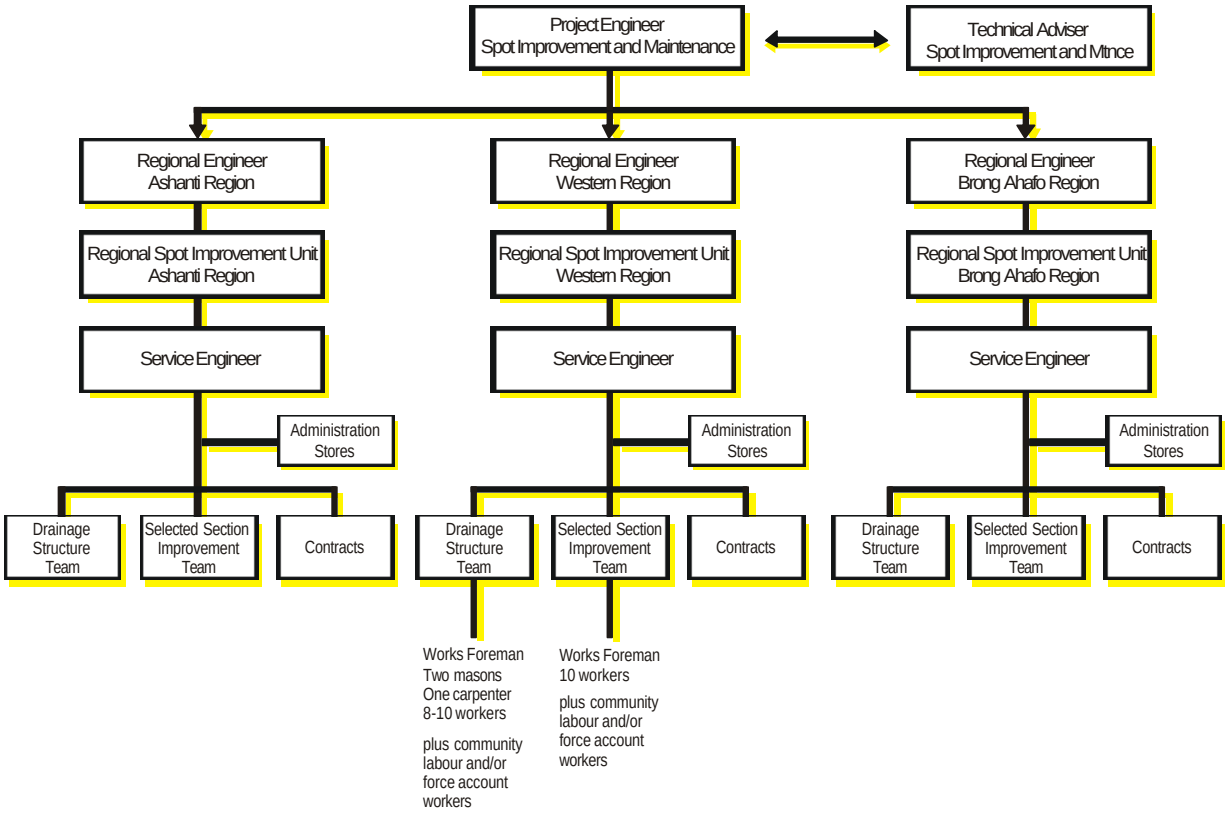
Contractors	-	8-10
Supervisors (DFR)	-	3
Supervisors (contractors)	-	8-10
Foremen (DFR)	-	14
Foremen (contractors)	-	24-30
Timekeepers	-	uncertain
Storekeepers	-	11-13
Accountants	-	11-13
Mechanics	-	uncertain

The organisational structure assumed for the training is as follows:



* Labour will be employed as required but the total number on three sites should not normally exceed 210 workers.

Labour-based Road Improvement by Contract
Proposed Contractor Organisation



Proposed Organisation Chart Regional Spot Improvement Unit

In this report it is assumed that the service engineer is at the equivalent level of supervisor in a contracting firm.

4.3 Part 1 - Demonstration Site

The purpose of the demonstration site is to enable the trainers to visit an on-going site during the introductory training .in Part 2 of the training phase. In Part 1 of the training phase the staff who are to run the demonstration site will be trained and the site will be set up and run for about a month before Part 2 of the training phase begins. This is shown diagrammatically in 4.1 above.

The demonstration site should be run by a selected group of DFR supervisors and foremen under the guidance of DFR project engineers and expatriate staff. The DFR supervisors and foremen will later join the other trainees for the more in-depth training in Part 2. This selected group should comprise at least two supervisors and four foremen. It is important to select particularly apt and capable persons, since after some introductory training they should be able to run the demonstration site.

The introductory training course will last about a week. It will be identical to the one which will be run in Part 2 for the other trainees and will introduce them to the basics of labour-based road construction and maintenance. It should be run by the training specialist in co-operation with the GHA trainer and the expatriate engineers. An appropriate date would be 1-2 weeks before the start-up of the demonstration site.

An advantage of this introductory course is that it enables the training team to test some of their material and thus gives them the chance to make modifications to it before the main training starts.

4.4 Part 2 - Main training

Part 2 will start 2 weeks before the end of Part 1 (see diagram in section 4.1). During these two weeks the main group of trainees will go through the introductory course and pay visits to the demonstration site. When Part 1 is over and all participants have received the introductory training, the demonstration site will no longer be used for demonstration, but for the trainees to practice on. From that point onwards it will be denoted the test site in this report to distinguish it from a site which is used for demonstration purposes.

Part 2 constitutes the main training programme, which will last about 17 weeks. The following categories of trainees will receive training: contractors, supervisors, foremen, accountants, storekeepers, timekeepers, mechanics and operators. The theoretical part of the training will take place at the training centre to be set up in Wiawso, whereas the practical part will be done on the test site under the guidance of project staff.

4.5 Curricula

Based on the training needs survey and discussions, the following curricula are proposed for the different types and levels of staff. The recommended list of topics and sub-topics should be considered as a general guideline which is subject to modification as necessary.

For each topic, the categories for whom it is applicable is listed. When using the list it should be borne in mind that in some firms one person may cover two or even more categories. The categories are split into two: recommended and optional. "Recommended" means that the topic is directed towards those who fall under these categories. "Optional" is used for those categories for which the topic may be of use. The training programme should be organised in such a way that apart from being trained in the recommended topics, the participants should also be able to take part in the training on topics which are optional for them.

The curricula are for DFR personnel as well as contractors' staff. The supervisors' category is equivalent to the level of district engineer in the DFR.

The timing of the topics is approximate, since it depends on the exact content and the training method that is used. However, no major deviations are expected.

The curricula can be regarded as being in three parts:

- Introductory training on labour-based road works. This provides the supervisors and the foremen with the necessary skills to operate a site.
- Specialised training on labour-based road work. This goes into the subject in more detail and includes technical topics of road construction and maintenance (survey, drainage, soil mechanics, structures etc.).
- Company management and overall management of road construction and maintenance.

Most of the specialised topics are recommended for both supervisors and foremen. Not everything will be 100% relevant to everybody in both categories, but it should be kept in mind that not all the firms may have an identical division of responsibilities. Also, responsibilities of individuals may change after the training through, for example, promotion of foremen to supervisors. Therefore, it will be advantageous to extend the training beyond the specific functions of the individuals.

In the curricula below, reference has been made to Learning Elements of the "Guide to the Training of Supervisors for Labour-based Road Construction and Maintenance". The references provide a general outline of the proposed content of the various training sessions. For some topics, modifications and additions will have to be made to the existing learning elements.

CURRICULA

1. Introductory training

Topic	Sub-topics	**Recommended Category	**Optional Category	Duration in Class-room
The Programme	LE 0-5*	CO/SU/FO		5 days
Planning	LE 4-5	CO/SU/FO		
Reporting and Control	LE 0-5	CO/SU/FO/TI		
Work Organisation	LE 0-2	CO/SU/FO		
Tools and Equipment	LE 0-7	CO/SU/FO/ST		
Surveying and Setting Out	LE 2 and 5	SU/FO		
Clearing	LE 0-6	SU/FO	CO	
Earthworks	LE 4-5	SU/FO	CO	
Drainage	LE 4-5	SU/FO	CO	
Gravelling	LE 0-2	SU/FO	CO	
Maintenance	LE 0-6	CO/ SU/FO		

Comments: Some of these topics are suited for demonstration in addition to subject learning, both at the training centre and on the demonstration site. The details of the methods to be used should be determined in the pre-training phase in collaboration with experienced instructors in labour-based road construction and maintenance.

* Refers to the learning elements in the "Guide to the training of supervisors for labour-based road construction and maintenance".

** Categories:
CO - contractors
SU - supervisors
FO - foremen
AC - accountants
ST - storekeepers
TI - timekeepers
ME - mechanics
OP - operators

CURRICULA

2. Specialised Training

Topic	Sub-topics	Recommended Category**	**Optional Category	Duration in class-room
Surveying and Setting Out	LE 1, LE 3-4 and 6-8*	SU/FO		2 days
Earthworks	LE 3 and LE 6	SU/FO		1 day
Drainage	LE 4-7	SU/FO		½ day
Soil Mechanics	LE 0-6	SU/FO		1 day
Concrete Technology	LE 0-7	SU/FO Mason also considered		½ day
Structures	LE 0-6	SU/FO		1 day
Gravelling	LE 3-9	SU/FO		1 day
Special Maintenance	Analysis, methods and organisation	SU/FO	CO	2 days
Book Keeping	LE 0-2	AC	CO	3 days
Equipment Maintenance	LE 0-6	ME/OP		

Comments: Some of the topics are suited for demonstration and project work in addition to subject learning. The details of this should be worked out in the pre-training phase in collaboration with experienced instructors in labour-base road construction and maintenance. The training of mechanics and operators in equipment maintenance should be discussed with the management of the Plant Pool.

* Refers to the learning elements in the "Guide to the training of supervisors for labour-based road construction and maintenance".

** Categories:
CO - contractors
SU - supervisors
FO - foremen
AC - accountants
ST - storekeepers
TI - timekeepers
ME - mechanics
OP - operators

CURRICULA

3. Management Training

Topic	Sub-topics	Recommended Category**	**Optional Category	Duration in class-room
Estimating	Materials Labour Equipment Unit Rates	CO/SU		3 days
Conditions of Contract		CO		1-2 days
Overall Planning	Programming Labour Allocation Equipment Materials scheduling	CO/SU	SU	3 days
Company Management	Organisation Meetings Head Office Operations	CO		2 days
Human Relations	Communication Motivation Recruitment	CO/SU/FO		2 days
Finance	Cost Control Budgeting Financial Planning	CO	AC	3 days
Productivity	Method Analysis Activity Level Incentives Unit Cost	CO/SU/FO		3 days

Comments: Some topics are well suited for action learning and/or project work in addition to subject learning. Review sessions are not included in the estimated durations.

4.6 Training methods

4.6.1 General

A detailed outline of the methodology and contents will be prepared at a later stage. However, there are already certain data on the programme which should determine the training methodology:

- Following the class-room training the trainees should be equipped with certain skills in the management of labour-based road works. This implies that the class-room activities have to be action oriented and reflect the practical problems which will be experienced on site.
- The trainees will have experience from supervision of road construction and maintenance. This expertise should be utilised in the training by making the learning as participative as possible. This can be done by making the learning a process where the participants are allowed to combine basic theory with their own experience to build the required skills.

There are six methods which are recommended for the programme. They are explained in more detail below.

- Subject learning (in class-room)
- Project work (in class-room)
- Action learning (in class-room)
- Demonstrations (in class-room or on site)
- On-site application
- Review sessions (in class-room or on site)

4.6.2 Subject Learning

This means learning the substance of a topic and its general applications. Exactly which methodology is most suitable will vary from topic to topic. Parts of some topics will be best conveyed by lecturing and illustrating on the blackboard. For others, the optimal method may be for the participants to study and discuss the theory in groups before going on to solving subject related exercises. This approach makes the maximum use of the participants' previous experience. Exercises and plenary discussions should be used to reinforce the learning. For the keeping of records and reporting in-basket exercises) should be considered. Human relations could be learned effectively through role plays.
In-basket exercises are simulations of the situation in an office where the trainees respond to in-coming documentation by taking action, such as for example registering data and filing.

4.6.3 Project work

This involves utilising the participants' knowledge acquired in the subject learning in developing the management system for the test site. Project work will be particularly suited to those topics related to the planning and organisation of the work on site. For example, following the subject learning for planning where they learn the application of the planning principles for labour-based road construction, the participants would prepare a plan for a section of their test road - labour allocation, materials scheduling, equipment scheduling and expected expenditure. When doing the project work they should receive support from the instructors. The outcome of the project work, for example a detailed work programme, will then be implemented on the test site. In this way the participants are able to immediately put into practice what they learn and experience the effects of it during the implementation.

4.6.4 Action learning

Action learning is suggested to be used for topics which are best learned by the participants devising a procedure based on their in-sight and experience rather than on theory learned from training material or from the trainer. This is an effective way of learning when local parameters are predominant and the trainees' own experience and judgement are predominant inputs. An example is Company Management, where, if the participants work together in a structured way under the guidance of the instructors, they are able to identify the functions which are important and how they should be carried out. The advantage of employing action learning is that the end product will automatically be tailored to their own situation.

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

4.6.5 Demonstrations

Some topics, or parts of topics are best suited for demonstrations. Surveying, for example, is best learned by demonstration after the theory has been learned. For some demonstration purposes a scale model of the test road and the labour force can be made in the class-room to reinforce the learning of the theory.

A major part of the demonstrations should take place at the demonstration site. The work there should be co-ordinated with the class-room activities so that after a certain topic has been dealt with, the trainees are able to see its practical implementation on the test site.

4.6.6 On-site application

Following class-room training the trainees will assume functions on the test site. When arriving on site they should have the necessary skills to organise and co-ordinate the work. On the test site these skills will be improved by working under the guidance of the DFR service engineers and expatriate staff. On the site the project engineers should be equipped with means of monitoring the trainees' performance for use at review sessions back in the class-room. In addition to standard forms for performance evaluation one might consider the use of video recording of certain operations for play-back in the class-room.

4.6.7 Review sessions

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

The review sessions should serve both as a means of monitoring and instruction related to project work (4.4.3) and on-site application (4.4.6). Particularly progress, expenditure and unit costs should be reviewed and compared to what was projected. The trainees should make the necessary modifications under the guidance of the trainer and analyse discrepancies.

4.7 Programme

Based on the curricula outlined under 4.5, a tentative programme for the training has been prepared. The programme suggested below should be regarded as a basis from which the training specialist can work to finalise the programme.

Owing to the large number of foremen (38) it is suggested that they are split into two groups, sometimes together with the supervisors. Training more than 25 persons at a time is likely to make the training less effective for the individual trainee. Even 25 persons in a group is quite a high number, but operating with more than two groups for the same topic would be impractical in terms of coordinating the work on site.

PROGRAMME

Week	Activities	Comments
1	Introductory training for selected DFR staff who are to set up and run demonstration site.	
2-5	The demonstration site is run under the guidance of the project engineers	
6-7	Supervisors and contractors receive introductory training. A total of one week is spent in the class-room and one week visiting the demonstation site.	Arrangements for transportation of trainees should be looked into. Week six is the beginning of Part 2 of the training phase. Part 1 ends at the end of Week 7.
8-9	Supervisors work as foremen on the demonstration site. Foremen, Groups 1 and 2 receive introductory training. While one group is in the class-room, the other is visiting the demonstration site.	This allows a gradual increase in responsibility for the supervisors.
10-11	Supervisors assume functions as 10-11 supervisors on the test road. Foremen work as foremen on the test road under the supervisors. Accountants, storekeepers and timekeepers receive specialised training.	
12	Half of the supervisors and foremen receive specialised training while the other half is working on the test site.	The specialised training should be co-ordinated with the site activities so that the trainees are able to apply what they learn in the class-room when they go to the site. The accountants set up and maintain the book-keeping system for the rest of the training period.
13	The other half of the supervisors and foremen receive specialised training while the first half is on site.	
14	Specialised training for the first half of supervisors and foremen while the second half remain on site.	Review sessions should be run some evenings to solve particular problems in connection with the site work.
15	Specialised training for the second half of supervisors and foremen while the first half goes back on site.	
16	First half of contractors, supervisors and foremen trained in productivity and human relations while other half of supervisors and foremen are on site.	The foremen will only take part in the training which is relevant to them.
17	Second half trained in productivity and human relations while first half go back to site.	
18	Implementation of productivity measures on site. Review sessions held on some evenings.	Should consider inviting contractors to review sessions on productivity.
19	Contractors and supervisors are trained in estimating and planning.	Estimates and programmes are worked out for a section of the test road. If it is found convenient, the work on the test road can be halted during this week. Alternatively, the contractors and supervisors can be split into two groups to provide continuity of activities on the road.
20-21	All supervisors and foremen work on site. Review sessions are held to monitor adherence to programme and estimate. Contractors are trained in finance and company management.	
20-23	Work on site and review sessions	

A programme for training of mechanics and operators should be drawn up at a later stage.

4.8 Training Aids

The following training aids are suggested to be used:

(a) Training manuals.

(b) Video - camera, recorder and screen. It would serve two purposes:

- Showing films on the labour-based construction
- Recording sequences from the test site for review in the class-room and future presentations of the programme.

(c) Sand-tray and figures to illustrate technology and labour force organisation in the class-room.

(d) Overhead projectors and slide projectors.

(e) Flip-charts and black-board.

(f) Maps to a suitable scale for the site work.

(g) Demonstration items, such as surveying equipment, hand-tools, etc.

4.9 Instructors

(a) In the class-room:

- External training specialist to co-ordinate the sessions
- GHA trainer to assist the external training specialist
- Expatriate project engineers. - DFR project engineers
- DFR training person (if considered necessary),

(b) On site:

- Expatriate project engineers
- DFR project engineers.

4.10 GHA Participation

The duties to be assigned to the GHA member of the training team should be clarified and discussed in the pre-training phase. His involvement should primarily enable him to assume the methodological responsibility for future training courses of this nature.

4.11 BHC Involvement

It is suggested that a person from the training team works with a BHC accountant to write the training material and prepare the training session on book-keeping. This has been agreed with Mr. Amadu, Chief of the Engineering Services at BHC. The necessity of direct BHC contribution in the training sessions should be discussed with them.

4.12 Recording of Data

The material and methodology in the pre-training phase is assumed to be primarily working papers for the training team. The details are likely to change during the training. It is expected that in addition to this material, the action learning and project work will produce material which will be valuable for future training programmes. This material should be recorded in a format which allows it to be easily transformed into training manuals after the training phase.

4.13 Training Premises and Accommodation

It has been agreed that a separate building will be erected in Wiawso for the class-room training. In addition to being the training centre for the pilot project and pursuing activities, it would accommodate meetings to be held in connection with the project. The training centre should accommodate 30-40 persons comfortably, be well lit and have proper ventilation. It is important to keep in mind that intensive training sessions will be run for 8-9 hours per day, the outcome of which is crucial to the

success of the pilot project. It is also likely that the centre will accommodate training courses beyond the duration of the pilot project. Apart from the training aids mentioned under 4.6 above, the centre needs to be equipped with chairs and desks. Due consideration should be given to the type of furniture, bearing in mind that trainees will spend 8-9 hours a day in the class-room for as much as a week at a time.

Accommodation will be needed. Some of the trainees will spend almost 4 months in Wiawso. It is expected that a number of them will be from the Wiawso area. An estimate should be made as soon as possible of the approximate number of participants requiring accommodation. In addition to the trainees, accommodation should also be provided for the training specialist and the GHA member of the training team.

5 Post-training Phase

5.1 Write-up of Material and Guides

Following the training phase it is suggested that the training specialist is commissioned to transform the material prepared in the pre-training phase and the outcome of the action learning sessions and the project work into a format for future training. To accompany this material, a guide should be produced on the methodology for use by future trainers.

5.2 Forum for Further Up-grading

There should be possibilities of further training for the contractors and DFR staff after the training phase and also after the 5 km road contracts have been completed. This training, is suggested, should be more in the form of problem-solving sessions rather than conventional training. It would be a forum where participating contracting firms and/or DFR staff meet at regular intervals with project engineers to identify and solve problems which they face in the use of the labour-based method. If considered necessary, a methodology guide should be prepared for these sessions by the training specialist. The sessions will also provide the project staff with the opportunity to convey information to the contractors.

6 Training of Trainers

The involvement by a GHA person has already been described. It is assumed that he will already have some training experience, so by working with the training specialist he should be able to acquire the necessary competence to co-ordinate future training programmes. The need for giving this person additional training in instructional technology should be assessed at an early stage so as to enable such training to take place before the pre-training phase.

The possibility of attaching a DFR person to the training team was discussed during the mission. This would be valuable, provided it is someone with interest and ability to understand and use the different learning mechanisms at work in such a programme. If he does not possess previous experience in training, a course in instructional technology would be necessary before the training work starts.

It remains to be analysed how local training competence can or should be established in order to cater for future needs and to what extent such considerations should fall under the pilot project. A more comprehensive review would be needed, including an analysis of how the pilot project ties in with other activities under the 4th highway project with regard to the provision of trained instructors.

7 Other Activities under the 4th Highway Project

It is the intention to train 20-30 contractors for equipment intensive work on trunk roads. These contractors employ on average 20-30 workers. According to the Project Management Unit (PMU), training material will be collated for training the contractors in subjects like tendering, book-keeping and management of equipment. Advisors will arrive to carry out the training. It seems likely at this stage that the preparation of material for the pilot project will start before the training material for the trunk road contractor courses are prepared. However, when the content of the material for the pilot project has been determined, it should be discussed with PMU. Apart from ensuring compatibility, this may avoid duplication of efforts.

8 Budget Items

	Item	Requirement	Funding Source
1	Training Specialist(s)	3 m/m	UNDP
2	Training Specialist during training phase	4 m/m	UNDP
3	Training Specialist during post-training phase	2 m/m	UNDP
4	GHA Trainer	6 m/m	
5	DFR Trainer	6 m/m	
6	Training of GHA and/or DFR staff in Instructional Technology		To be determined
7	Training Centre	Building Furniture Teaching aids	To be determined
8	Audiovisual equipment		To be determined
9	Accommodation for trainees and trainers		To be determined
10	Transport of trainees		To be determined

GHANA: FEEDER ROADS IMPROVEMENT AND MAINTENANCE BY CONTRACT
Curriculum for the management training of contractors and DFR staff
By Tor Hernes, August 1986

1 Introduction

This is a complementary paper to the report of May 1986 entitled "Summary of training needs survey and proposal for the training at Wiawso of contractors' and DFR staff". It sets out the content of the management training in more detail. The May report divides the curricula into 3 parts; introductory training, specialised training and management training (refer section 4-5 curricula). It is assumed that the two former categories of training can largely be covered by the "Guide to the training of supervisors for labour-based road construction and maintenance", but with some adaptations to this project. The material for the management training, however, will be derived from other sources and partly re-written especially for the Ghana project. The intention of this paper is thus to guide the author in compiling this material and also aid the training specialist to select a suitable training methodology.

2 Management Curriculum as Spelled Out in the May Report

Topic	Sub-topics	Recommended Category**	**Optional Category	Duration in class-room
Estimating	Materials Labour Equipment Unit Rates	CO/SU		3 days
Conditions of Contract		CO		1-2 days
Overall Planning	Programming Labour Allocation Equipment Materials scheduling	CO/SU	SU	3 days
Company Management	Organisation Meetings Head Office Operations	CO		2 days
Human Relations	Communication Motivation Recruitment	CO/SU/FO		2 days
Finance	Cost Control Budgeting Financial Planning	CO	AC	3 days
Productivity	Method Analysis Activity Level Incentives Unit Cost	CO/SU/FO		3 days

Comments: Some topics are well suited for action learning and/or project work in addition to subject learning. Review sessions are not included in the estimated durations.

3 Topic: Estimating

3.1 General

The estimating is suggested split in two; calculation of quantities and pricing of the quantities. Although in many instances an operation is priced directly, it is useful to make this distinction because quantities of materials, labour and equipment are used for planning the project.

Existing material on estimating and tendering for building contractors produced by the ILO would provide valuable substance to the topic of both estimating and pricing. Some rewrite will however be needed.

3.2 Calculation of quantities

Materials - Calculate the volumes required for the job, taking into account:

- The extent of the repair
- Type of repair
- Wastage
- Compaction
- Type of material

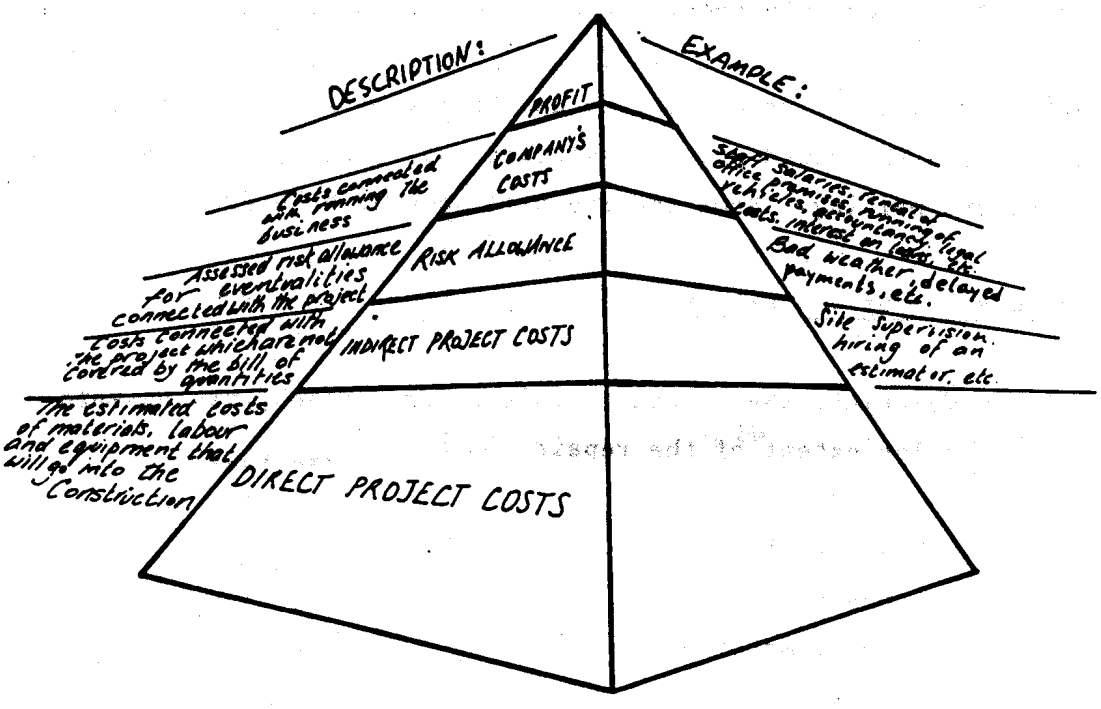
Labour - Estimate the numbers of different types of labour for various operations:

- Number of workers
- Supervision
- Support staff
- Use of labour constants

Equipment - Estimate how much of what types of equipment will be needed for various operations.

3.3 Pricing

This will include pricing of the quantities of materials, labour and equipment as well as the various kinds of overhead expenditure. The training should also include various ways of analysing and making comparative assessments of different cost alternatives. The different price components are envisaged as shown in the below pyramid:



Direct project costs:

- Cost of materials, including transportation
- Cost of labour wages, transportation, insurance, tax, overtime, etc.
- Cost of equipment - depreciation, running costs, maintenance

Indirect project costs:

- Supervision
- Accommodation
- Miscellaneous costs

Risk allowance:

- Allowance for eventualities such as bad weather, delayed payments, etc.

Company costs:

- Management's salaries
- Head office operations
- Interest on loans
- Premises, electricity, telephone, etc.
- Other costs

Profit - This should be analysed and the percentage for different situations be discussed.

Unit rates - These will be calculated for different operations, such as:

- per sq.m. resurfacing
- per culvert
- Etc.

The parameters influencing the unit rates should be identified and analysed.

4 Conditions of Contract

The contract format to be used for the project should be used as a basis for the training. Exercises and questions (or possibly a quiz) could be built around this to reinforce the learning. Relevant areas of attention would be:

- The contractor's responsibilities
- The client's responsibilities
- Responsibilities concerning recruitment and administration of labour.

5 Planning and Programming

This will enable them to learn the planning of resources and programming of works at the level of the company and project management. That is to say, the overall resource allocation and programme to be worked out by the contractor (or district engineer) and his supervisor. It is envisaged that most of what is to be contained in this topic will have to be written especially for the Ghana project. This will also make it easier to tailor it to the trainees right away. The importance of planning for maximum efficiency should be emphasised and illustrated in the material.

The different levels of planning:

- Project planning
- Daily planning (Mostly informative)

Programming

- Timing of different operations for maximum saving of time and money. Use of planning graphs.

Materials

- Scheduling how much will be needed when and where
- Assessing when orders should be placed
- Planning where they should be bought from at different stages of the project

Labour

- How many workers will be needed of various categories at different stages
- Where and for how long they will be needed
- Transportation needs
- Analysis of availability

Equipment

- How much and what types will be needed
- For when, where and for how long will it be needed

6 *Company Management*

As mentioned in the May report, company management would be well suited for a type of action learning whereby the trainees review their companies/organisations. Together they analyse how they can operate at maximum efficiency through efficient procedures and effective management of resources. Rather than writing learning material, it would probably therefore be more efficient to establish a format which enables them to analyse and improve their organisations. Key words for this topic are suggested as follows:

Organisation

- What sort of staff to have in different positions (i.e. supervisor, engineer, foremen, machine operators, time keepers, secretaries, etc.)
- What should be their qualifications
- What should be their responsibilities

Meetings

- When to hold meetings, such as, for example, for project planning
- The purpose of holding them, such as, for example, to get ideas and motivate employees
- Who should attend

Head office operations - How to arrive at a rational system of book-keeping and secretarial assistance.

Reporting

- Reporting routines within the organisation
- Nature of technical and financial reports

7 Human Relations

With large labour forces employed, the contractors and supervisors should be given the opportunity to improve their inter-personal skills. When the reporter visited Ghana in April it was expressed by one of the persons interviewed that contractors generally exhibit a severe lack of ability to treat their employees properly.

The training in human relations is probably not going to lead to great changes in their behavior. However, it may serve as an eye opener. It is suggested that a significant proportion is given to discussion and analysis of actually how much money a company and organisation can lose by neglecting the importance of good personal relations.

The topic is well suited for role plays and discussions. Some basic principles can be taken from ready-made training packages on supervisory skills which are on the market. There also exist video tapes to go with the packages. Although they have been made for western cultures, they would serve the purpose of illustrating the application of inter-personal skills. Before preparing for the training, it is advisable to make a more detailed examination of local characteristics.

Communication:

- Communicating work assignments
- Defining performance expectations

Motivation:

- Giving performance feedback
- Discussing a performance problem
- Rewards

Recruitment:

- Criteria for selection
- Interviewing
- Evaluation

8 Finance

The finance training should enable them to learn how to plan and control their money at two levels; individual project level and at the company level. For individual projects, the most important skill would be how to do a cash flow analysis and cost control. This would also be necessary at company level. In addition, it would be preferable with some training in financial strategy and budgeting. By learning some simple principles, they should be able to analyse different alternatives of buying and expending finance. It is generally recognised among contractors that many of them lack the ability to think ahead and prepare, even for expenses which are imminent.

Cost-control:

- Materials (project)
- Labour (project)
- Equipment (project)
- Overheads (company)

Cash flow analysis:

- Project Project analysis
- Company analysis

Budgeting - Planning of the company's resources

9 *Productivity*

The aim of the productivity training would be to enable the participants to operate projects at maximum cost effectiveness. Emphasis should be laid on analysis of the organisation of sites and methods of work with a view to improvements. A substantial part of the material can be taken from an existing ILO training module on site productivity for building contractors. Productivity is a topic which is well suited for project work (see section 4.6 of the May report).

The concept of productivity:

- Definition
- Factors affecting productivity

Recording and analysis of work methods:

- Selection of operations
- Charting methods
- Analysis for improvement

Activity levels:

- Recording
- Analysis

The workers and productivity:

- Use of incentives

Unit-costs:

- Calculation of unit cost
- Analysis of the influence of different productivity measures on unit cost.