



Trainer's Guide Rehabilitation Labour-Based Technology for Rural Road Works



Don Bosco Foundation
Training Center in Comoro

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Trainer's Guide, Labour-based Technology for Rural Road Rehabilitation

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Category	Code	Topics
Supervisors/ Engineers	LBT-1	✚ Opening and introduction
	LBT-2	✚ Pre-test
Supervisors	LBT-3	✚ Review Geometry
Supervisors/ Engineers	LBT-4	✚ Choice of road construction technology
	LBT-5	✚ Road terminology
	LBT-6	<ul style="list-style-type: none"> ✚ Introduction of road setting out hand tools and function of the tools ✚ Setting out horizontal alignment ✚ Setting out vertical alignment ✚ Setting out road cross sections ✚ Field practice for setting out road alignment
Supervisors/ Engineers	LBT-7	✚ Introduction of road construction hand tools and equipment
	LBT-8	✚ Incentive scheme for labour works
	LBT-9	✚ Sequence of construction activities
	LBT-10	✚ Work organization: setting tasks and calculate work forces
	LBT-11	✚ Road clearing and levelling operations
		✚ Construction of road in rolling terrains
		✚ Construction of road in hilly terrains
		✚ Construction of road embankment
		✚ Compaction of earth work
		✚ Exercise for calculation of earth works and work forces for earthwork construction
	LBT-12	<ul style="list-style-type: none"> ✚ Gravel quarry preparation, Load and off- load gravel, ✚ Calculation for hauling gravel ✚ Construction gravel wearing course ✚ Simple method for testing proportion of gravel (settling test)
	LBT-13	<ul style="list-style-type: none"> ✚ Introduction of alternative road surfacing options ✚ Construction of road base course
	LBT-14	✚ Construction of Penetration Macadam Surface

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	LBT-15	<ul style="list-style-type: none"> ✚ Introduction of basic drainage structures ✚ Construction of scour check ✚ Construction of miter drain
	LBT-16	<ul style="list-style-type: none"> ✚ Introduction of concrete and stone masonry work
Supervisors/ Engineers	LBT-17	<ul style="list-style-type: none"> ✚ Construction of lined drain, culvert and Gabion work
	LBT-18	<ul style="list-style-type: none"> ✚ Introduction of Bio engineering
Engineers	LBT-19	<ul style="list-style-type: none"> ✚ Planning
Supervisors/ Engineers	LBT-20	<ul style="list-style-type: none"> ✚ Role of the sit engineer, supervisor and gang leader
	LBT-21	<ul style="list-style-type: none"> ✚ Introduction of daily site plan, daily report, weekly report, monthly report ✚ Introduction site administrative formats: (fuel record, hand tools record, muster roll....)
	LBT-22	<ul style="list-style-type: none"> ✚ Recruitment of labour ✚ Establishment of site camp
	LBT-23	<ul style="list-style-type: none"> ✚ Cross cutting: Gender, elimination of child labour, HIV aids, environmental impact awareness ✚ Occupational Safety and Health (OSH)
	LBT-24	<ul style="list-style-type: none"> ✚ Post test ✚ Course assessment
Additional sessions provided to engineers and director of companies on contract management		

3 How to use these training guidelines

These training guidelines have been prepared as guide for trainers and should be read together with **Technical Manual for LBT for rural construction**.

These training guidelines consist of:

- (i) the introduction and timetable / training programme
- (ii) guidelines for the training course elements
- (iii) sample of course assessment and tests
- (iv) sample of exercises
- (v) pre-printed power points slides presentation for each course element
- (vi) templates

The recommendations for the use of hand outs, flipcharts included in these training guidelines, do not exclude the possibility of using overheads or beamers, where available. Some of the elements of the training programme are more suitable for active participation by the participants, and many other topics which may be new, need to be introduced in the form of a presentation or lecture. Wherever possible there should be variety in the presentation and involvement of the participants in order to retain their attention and interest in what is being presented. The modules include instruction / suggestions of how the trainer can present various topics. These are suggestions and can be replaced by the trainer's own ideas, provided the involvement of the participants is guaranteed.

4 Time table/Training programme for Supervisors

SCHEDULE FOR SUPERVISORS TRAINING IN LBT FOR RURAL ROAD CONSTRUCTION					
<i>Week 1</i>	<i>Day-1</i>	<i>Day-2</i>	<i>Day-3</i>	<i>Day-4</i>	<i>Day-5</i>
8:30-9:15	Opening the training and introduction	Calculation area and slope of road element	Exercise of volume calculation	Setting out vertical alignment	Setting out off set
9:15-10:00		Calculation area and slope of road element	Exercise of volume calculation	Setting out vertical alignment	Road construction hand tools and equipment
Cha dader/Tea break					
10:30-11:15	Pretesting	Exercise of area and slope calculation	Choice of road construction technology	Setting out road cross sections	Incentive scheme for labour works
11:15-12:00	Pretesting	Exercise of area and slope calculation	Road terminology	Setting out road cross sections	Incentive scheme for labour works
Han meudia/Lunch break					
13:30-14:15	Introduction and review geometry	Calculation volume of road element	Introduction of road setting out hand tools and function of the tools	Setting out road cross sections	Exercise on calculation of task rate
14:15-15:00	Geometry: Area and slope calculation	Calculation volume of road element	Setting out horizontal alignment	Practice for Setting out horizontal alignment and check line level	Field practice for Setting out vertical alignment and offset
Cha loraik/Tea break					
15:30-16:30	Geometry: Area and slope calculation	Calculation volume of road element	Setting out horizontal alignment		

SCHEDULE FOR SUPERVISORS TRAINING IN LBT FOR RURAL ROAD CONSTRUCTION					
<i>Week 2</i>	<i>Day-6</i>	<i>Day-7</i>	<i>Day-8</i>	<i>Day-9</i>	<i>Day-10</i>
8:30-9:15	Sequence of construction activities	Exercise on work organizing	Construction of road embankment	Construction gravel wearing course	Penetration Macadam surface
9:15-10:00	Sequence of construction activities	Exercise on work organizing	Exercise for constructing earth work	Construction gravel wearing course	Penetration Macadam surface
Cha dader/Tea break					
10:30-11:15	Work organization: setting tasks and calculate WDs	Road clearing and leveling operation	Compaction	Exercise on calculation of WDs for gravel spreading	Penetration Macadam surface
11:15-12:00	Work organization: setting tasks and calculate WDs	Construction road in rolling terrain	Compaction	Simple method for grading test of gravel	Introduction of basic drainage structures
Han meudia/Lunch break					
13:30-14:15	Field practice for Setting out road cross sections	Construction road in rolling terrain	Load, un-load gravel and hauling gravel	Introduction of road surfacing	Introduction of basic drainage structures
14:15-15:00	Field practice for Setting out road cross sections	Construction road in hilly terrain	Load, un-load gravel and hauling gravel	Construction road Based course	Construction of scour check and Miter drain
Cha loraik/Tea break					
15:30-16:30	Field practice for Setting out road cross sections	Construction of road embankment	Exercise on calculation of quantity load and off load gravel	Construction road Based course	Construction of scour check and Miter drain

SCHEDULE FOR SUPERVISORS TRAINING IN LBT FOR RURAL ROAD CONSTRUCTION				
<i>Week 3</i>	<i>Day-11</i>	<i>Day-12</i>	<i>Day-13</i>	<i>Day-14 to day-23</i>
8:30-9:15	Introduction of concrete, stone masonry	Introduction of Daily report and weekly report	Establishment of site camp and site store	Site practical training to carry out road construction activities that have been introduced in the class room and quality controle: The activities include: Setting out road alignment, construction of side drain, leveling and forming Camber for earth work, graveling and compaction, construction of stone masonry lined drain, concrete work, tasting: gravel (Settling test and DCP test) testing concrete (Slum test). The site practical training also include: filling daily site plan, muster roll, filling stone record, controlling and filling material delivery (gravel)
9:15-10:00	Introduction of concrete, stone masonry	Introduction of Daily report and weekly report	Environmental awareness and mitigation	
<i>Cha dader/Tea break</i>				
10:30-11:15	Introduction of concrete, stone masonry	Introduction site administrative formate	perational Safety and health and HIV/Aids awareness	
11:15-12:00	Construction of lined drain, culvert and Gabion	Introduction site administrative formate	Operational Safety and health and HIV/Aids awareness	
<i>Han meudia/Lunch break</i>				
13:30-14:15	Construction of lined drain, culvert and Gabion	Introduction of Muster payroll + exercise	Work ethic	
14:15-15:00	Construction of lined drain, culvert and Gabion	Labor issue, recruitment of the labor and Gender issue	Final writing test and training assessment	
<i>Cha loraik/Tea break</i>				
15:30-16-30	Role of the site supervisor and gang leader	Labor issue, recruitment of the labor and Gender issue	Final writing test and training assessment	

5 Time table/Training programme for Engineers

SCHEDULE FOR ENGINEERS TRAINING IN LBT FOR RURAL ROAD CONSTRUCTION					
<i>Week-1</i>	<i>Day-1</i>	<i>Day-2</i>	<i>Day-3</i>	<i>Day-4</i>	<i>Day-5</i>
8:30-9:15	Opening the training and introduction	Setting out road cross sections	Choice of road construction technology(Cost comparison of LB and Equipment based)	Road clearing and leveling	Load and un- load Gravel and delivery gravel
9:15-10:00	Pretest	Setting out road cross sections	Road construction hand tools and equipment	Road clearing and leveling.	Exercise on calculation of quantity un load and haulage of Gravel
Cha dader/Tea break					
10:30-11:15	Pretest	Setting out road cross sections and road terminology	Incentive scheme for labour works and exercise	Construction road in rolling terrain.	Construction gravel wearing course
11:15-12:00	Hand tools for setting out. Setting out horizontal alignment	Choice of road construction technology	Incentive scheme for labour works and exercise	Construction road in Hilly terrain	Construction gravel wearing course
Han meudia/Lunch break					
13:00-13:45	Setting out vertical alignment	Field practice for setting out cross sections	Sequence of construction activities	Construction road embankment	Calculate labour and setting task work for gravel spreading
13:45-14:30	Field practice for Setting out horizontal, vertical alignment and off set	Field practice for setting out cross sections	Work organization, setting task and labour balancing	Calculate labour and setting task work for Earthwork	Calculate labour and setting task work for gravel spreading
Cha loraik/Tea break					
15:00-15:45	Field practice for Setting out horizontal, vertical alignment and off set	Field practice for setting out cross sections	Work organization, setting task and labour balancing	Calculate labour and setting task work for Earthwork	Construction road Based course
16:45-16:30	Field practice for Setting out horizontal, vertical alignment and off set	Field practice for setting out cross sections	Management of basic equipment	Compaction	Construction road Based course

SCHEDULE FOR ENGINEERS TRAINING IN LBT FOR RURAL ROAD CONSTRUCTION					
<i>Week-2</i>	<i>Day-6</i>	<i>Day-7</i>	<i>Day-8</i>	<i>Day-9 to day-18</i>	
8:30-9:15	Penetration Macadam surface	Construction of lined drain, culvert and Gabion	Role of site engineers and supervisors	Site practical training to carry out road construction activities that have been introduced in the class room and quality controle: The activities include: Setting out road alignment, construction of side drain, leveling and forming Camber for earth work, graveling and compaction, construction of stone masonry lined drain, concrete work, tasting: gravel (Settling test and DCP test) testing concrete (Shum test). The site practical training also include: filling daily site plan, muster roll, filling stone record, controlling and filling material delivery (gravel)	
9:15-10:00	Penetration Macadam surface	Construction of lined drain, culvert and Gabion	Labour issue, recruitment of labour, Gender issue		
Cha dader/Tea break					
10:30-11:15	Introduction of basic drainage and drainage structures	Planning	Establishment of site camp		
11:15-12:00	ntroduction of basic drainage and drainage structures	Planning	Environmental awareness and mitigation		
Han meudia/Lunch break					
13:00-13:45	Introduction of concrete, stone masonry	Monthly, weekly report and daily report	Work ethic, operational safety and health and HIV / AIDS awareness		
13:45-14:30	Introduction of concrete, stone masonry	Monthly, weekly report and daily report	Work ethic, operational safety and health and HIV / AIDS awareness		
Cha loraik/Tea break					
15:00-15:45	Introduction of concrete, stone masonry	Introduction of site administrative formats	Writing test and course assessment		
16:45-16:30	Construction of lined drain, culvert and Gabion	Introduction of site administrative formats			

6 Comprehension level required:

Each training topic/subject required difference level of knowledge or skill based in importance of the training topic. The comprehension levels are categorized as below:

Comprehension level:

- Level 1:** orientated / aware of the subject
- Level 2:** basic comprehension and/or basic skill(s) to carry out the given job
- Level 3:** full comprehension and/or fully developed skills to carry out the given job

7 Guidelines to training topics and session plans







The training topics should be presented as the guide suggests. Sessions corresponds to the schedule in section 4 and 5 above. It is important to ask trainees to fill in the assessment of each training topic that at the end of each day.





The following questions should be asked to the participants to check that the important training elements have been understood.

The following 4 questions should be posed at the end of each topic:

- (i) Level of understanding of each topic
- (ii) How the trainee felt about the training technique used by the trainer
- (iii) How well the trainee felt that training material responded to the training topics
- (iv) Any comments from the trainee

A sample of the daily assessment form is attached in [Annex 3](#).

Opening and Introduction of the Training		Code: LBT-1
<p>Learning objective:</p> <p>Get know each other, backgrounds experiences and expectations. To ensure each participant aware of the administrative arrangement and agree some ground rules to make sure sessions are running smoothly. All training topics throughout the training are introduced.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1-2 h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and Projector 		<p>Comprehension level : 3</p> <p>General Methodology: Class room.</p>
<p>Hand out:</p> <ul style="list-style-type: none">  Administrative Information  Training Schedule 		
<p>How is this topic conducted It is important to get off to a god start. There may be an official opening before the actual training starts. Whether there is an official opening planned or not it is good to provide the context for the training, an overview of the course and what the expectations might be.</p> <ol style="list-style-type: none"> 1) All the trainees to introduce themselves start from the trainer. Each person should introduce him or herself eg by: name, where they come from, which company/institution they belong to, a brief description of their relevant experience. 2) Brief trainees about administrative arrangement during the training. 3) Explain how the trainees will be assessed and the requirements to achieve a Certificate. 4) Brief trainees about the training programme and the topics covered in the training, and techniques used for various session, the mix of lectures, exercises and practical training. 5) Introduce the "Technical Manual in LBT for rural road construction". Explain that the technical manual will be distributed in the end of the class room training. 6) Explain the use of power point slides, prepared to support the Technical Manual, and that printouts of the power point presentation will be distributed at the end of each session. 7) Setting rules for the training: After the introduction, the trainees should agree on a set of rules for the training. The rules shall then be written on a flip chart and displayed for the entire duration of the training. For instance: No smoking in the class room, to keep mobile phone on silent mode, to be punctual and disciplined, to respect each other, etc. 		
<p>Exercise</p> <p>Expectations: Each trainee is given a different colour Post-It to write his or her expectations of the training and what they hope to have learned from the training. All Post-It are posted on a flip chart paper. Read out some expectations and keep until the end of the class room training.</p>		

Pre-Test		Code: LBT-2
<p>Learning objective:</p> <p>A written Pre-Test is given to the trainees to test their knowledge of the subject matter prior to the training. This will include a few questions relating to the main topics to be introduced in the training.</p> <p>The result of the pre-test will be compared with result of a Post-Test, which will be conducted at the end of the class room training. The trainees are in the Post-Test given the same questions and the same amount of time as in the Pre-Test. The result of the Post-Test will form part of the final assessment of the trainee.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1.5</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Power point slide presentation  Flip chart and Projector 		<p>Comprehension level : 3</p> <hr/> <p>General Methodology: Class room.</p>
<p>Hand out</p> <ul style="list-style-type: none">  Pre-Test questionnaire 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Explain the purpose of the Pre-Test and ask trainees to do their best. Explain that the same test will be given at the end of the classroom training. 2) Each trainee will be given the test and shall answer the questions individually 3) Trainees will be given maximum 1.5 hours to complete the test. They can submit their answers before that time if they feel they have finished the test. 		
<p>Exercise</p> <p>Pre-Test Sample in Annex 1</p>		

Review of Geometry		Code: LBT-3
<p>Learning objective</p> <p>To ensure all the trainees understand basic geometry calculation on areas and volume of various geometry shapes. The trainees are able to calculate area and volume of road elements.</p>		
<p>Participants:</p> <p>🚧 Company Supervisors</p>		<p>Time: 8-16h</p>
<p>Trainer's material and equipment</p> <p>🚧 Training Manual in LBT for Rural Road Construction</p> <p>🚧 Power point slide presentation</p> <p>🚧 Flip chart and projector</p>		<p>Comprehension level : 3</p> <p>General Methodology: Class room.</p>
<p>Hand out</p> <p>🚧 Power point slides of different geometry shapes with formulas and road cross of element for calculation.</p>		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Draw different geometry shapes on a flip chart. Ask the trainees to write formulas for calculating area of the different geometry shapes (introduce at least 6 different geometry shapes) 2) Having agreed on the formulas, now put dimension on the geometry shape. Each trainee will calculate the areas of the shapes. Select some to present his/her results on the white board / flip chart. 3) Group exercise to calculate area of road site clearing activity. Give all the dimensions for the clearing activity and calculate together. 4) Draw a road cross section on the flip chart and give all dimensions, include camber and side drain. Ask a few trainees to split the road elements and identify different shapes. 5) Calculate area of the above shapes as a group exercise for road cross section on flat terrain, and then go through the same exercise but for other types of road cross section such as embankment, and cut sections. 6) Explain how to calculate the slope, in ratio and in percentage, and writ on the flip chart step by step instructions how to make the calculations. Give individual exercise as sample. 7) Give different dimensions for the calculation of the slope first a by given ratio and then by a given percentage. 8) Repeat this explanation by giving slope to calculate dimension and then given percentage to calculate the dimension. 9) Draw three different road cross section types (or show on a power point slide). Give % of the slopes and do group exercise to calculate area of the road cross sections (each group should be given different cross sections). 10) Explain how in theory to calculate the volume of one geometry shape and then repeat for other geometry shapes. 11) In addition: to ask two or three trainees to convert length, then convert, area and then 		

convert volume. Draw converting table of length, area and volume. Group exercise to fill the table.







12) Individual trainee to calculate area of each element. And calculate the slope, both as ratio and percentage. Group exercise: to calculate volume of road element road element.

13) Conduct a simple test with a mix of calculations at the end of the session







Exercise













Introduce several exercises for calculating different geometry shapes and slope calculation. A thorough understanding by the trainees of geometry calculation is essential in order to be prepared for the following sessions.












The exercises should be in the form of group exercises and individual exercise, and presentation of results on the flip chart. Trainees will gain knowledge in area calculation, volume and slope calculation. Volume calculations and conversions are however only introduced briefly. Sample of the exercises are attached in **Section 7**










Choice of Technology		Code: LBT-4
<p>Learning objective:</p> <p>To be aware that the contractor can make different technology options for rural road works and discuss advantages and disadvantages of using local resource based technology vs conventional methods for rural road construction. To ensure the trainees understand benefits of one option over the other specific areas.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 2</p> <p>General Methodology: Class room.</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides, advantage and disadvantage of using LBT for rural road construction  Questions for group exercise. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Ask participants what resources they think are required to construct rural gravel roads and list on a flipchart 2) Then ask participants to suggest which activities would be possible to do manually (even if they have listed equipment) 3) Ask the trainees to think of advantage and disadvantage of Machine based methods (conventional methods) for rural road construction compared to Labour based technology for road construction, and list these on the flip chart. 4) List on a flipchart advantages and disadvantages of labour-based vs machine based operations. Introduce the concept Labour-Based Technology, benefits to local communities and impact of using LBT on key factors such as cost, quality and time for construction projects. 5) Conduct group exercise, and when done ask each group to present their answers. 6) Summarise the discussion and again explain the benefits of using local resources and conclude that Labour-based technology for rural road construction and maintenance often is the best choice. Emphasis that labour is the key resource and work has to be well planned and well managed. <p><i>Invite a contractor's director to hear about real experiences and views on cost and management of equipment.</i></p>		
<p>Exercise</p> <p>Divide trainees into smaller groups. Ask them to think about their own situation and give reasons why they would prefer one option over the other. After a few minutes give them the sheet with some key questions to consider. Questions in Section 7.</p>		

Road Terminology		Code: LBT-5
<p>Learning objective:</p> <p>To ensure all trainees know the various type of the roads and where they are used and they need to be fully aware of type of road that they will work on (rural roads). Terms of the common road element and their function are known and understood by the trainees.</p>		
<p>Participants:</p> <p>🚧 Company Supervisors and Engineers</p>		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <p>🚧 Training Manual in LBT for Rural Road Construction</p> <p>🚧 Power point slide presentation</p> <p>🚧 Flip chart and projectors</p>		<p>Comprehension level : 3</p> <p>General Methodology: Class room.</p>
<p>Hand out</p> <p>🚧 Rural road cross section with all the road terminology (one blank and one completed).</p>		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Draw a road cross section with arrows towards the different road elements. Also hand out a blank road cross section without definition of road terms. Ask trainees together in groups to fill in the blanks to complete the drawing with the missing terms. 2) Ask each group representative to present the result of the exercise. 3) Write the correct terms of road element on the flip chart 4) The trainer explains definition of each road element and their function. The definition should be explained are: side drain, camber, shoulder, etc 5) To define and explain the function of: <ol style="list-style-type: none"> a. (standard) width of carriageway and shoulders b. (common) layers, sub-base, base, pavement c. (standard) cross fall d. longitudinal gradient, and the maximum in mountainous terrain e. (standard) size and shape of side drain f. briefly explain the three types of road cross sections and where are these types to be built 6) Explain common terms of national roads regional/district roads and rural roads. 		
<p>Exercise</p> <p>Trainees to complete drawing with missing road terms as group exercise. A road cross section with terms of road elements missing to be filled by the is attached in Section 7.</p>		

Setting Out - Equipment and Tools		Code: LBT-6a
<p>Learning objective</p> <p>To ensure that the trainees know the setting equipment and tools normally used in Labour-based technology, their functions and how each one is used.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Technical Manual in LBT for Rural Road Construction  Power point presentation  Flip chart and projector  Set of tools for setting out, including: tape measure, string line, line level, pegs, ranging rods and profile boards, hammer and chisel, ditch and camber templates etc. 		<p>Comprehension level : 3</p> <p>General methodology: Class room and field practice</p>
<p>Hand out:</p> <ul style="list-style-type: none">  Power point slides with setting out tools 		
<p>How this topic is conducted</p> <p>This session will start with a lecture explaining how setting out activities are usually done in labour-based construction (compared to more sophisticated equipment). The trainer will try to have as much interaction as possible. The trainer will introduce all the setting out items and will ask participants to try them out.</p> <ol style="list-style-type: none"> 1) All the hand tools should be available during the class. 2) Show all items of the setting out hand tools on the power point slide and then physically show the hand tools one by one. 3) Explain the function of each hand tool. 4) Explain how to use the line level and how to check the line level. 5) Group exercise: to get three trainees to form a group and each group to give a line level and piece of nylon string to practice how the line level works and then try to tie the string so that it remains horizontal, using the line level to verify. 		
<p>Exercise</p> <p>Form groups of three trainees to practice using the line level and nylon string.</p>		







Setting Out - Horizontal Alignment		Code: LBT-6b
<p>Learning objective:</p> <p>To ensure that the trainees are able to carry out of setting out of horizontal road alignment by using simple setting out equipment like profile board, ranging rod, line level and measuring taps.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 	<p>Time: 4-6h</p>	
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  A set of setting out tools 	<p>Comprehension level : 3</p>	
<p>General methodology: Class room and field practice</p>		
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of setting out equipment and tools 		
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will be asked to explain the process of setting out horizontal alignment, and thereafter carry out a practical field exercise near the classroom.</p> <ol style="list-style-type: none"> 1) Draw on the flip chart and explain how to set out horizontal alignment. Write on the flip chart step by step procedure of the setting out the horizontal alignment. 2) Repeat this step by step procedure using the power point slides. 3) After the explanation, ask one or two trainees to explain to the others to test their understanding. If the trainees are assessed that their understanding are not so clear, repeat the process again. Ask if everyone understands and ask someone who seems uncertain to try in front of the class. 4) Thereafter go through the process again and demonstrate how it is done using the step by step method. 		
<p>Exercise: Field practice Horizontal Alignment (outside at Don Bosco football field)</p> <ul style="list-style-type: none">  Divide the trainees into groups of 5-6 members.  Each group is equipped with a set of setting out tools such as: profile boards, ranging rods, hammer, string line, wooden pegs, line level and chisel.  Practice setting out centre line, horizontal curve and vertical curve (longitudinal profile) if possible, otherwise this can be practiced during site application.  Each group will set out 100m of horizontal alignment (straight line) and fix pegs at every 10m  Each group to set out a horizontal curve and fix wooden pegs for the curve  Each group should discuss and write down site observation from the exercise and once back to the class room each group to present its observations in a plenary. 		

Setting Out - Vertical Alignment		Code: LBT-6c
<p>Learning objective:</p> <p>To ensure that the trainees are able to carry out of setting out vertical road alignment by using simple setting out equipment like profile board, ranging rod, line level and measuring tapes.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 	<p>Time: 4-6h</p>	
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  A set of setting out tools 	<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>	
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of setting out tools 		
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will be asked to explain the process of setting out vertical alignment, and thereafter a practical field exercise near the classroom.</p> <ol style="list-style-type: none"> 1) Draw on the flip chart and explain how to set out vertical alignment. Write on the flip chart step by step procedure for setting out the vertical alignment. 2) Repeat the step by step procedure using the power point slides. 3) After the explanation, ask one or two trainees to explain to the others to test their understanding. If the trainees are assessed that their understanding are not so clear, repeat the process again. Ask if everyone understands and ask someone who seems uncertain to try in front of the class. 4) Thereafter go through the step by step process again and demonstrate how to set out road gradient using a line level. 		
<p>Exercise: Field practice Vertical Alignment (outside at Don Bosco football field)</p> <ul style="list-style-type: none">  Use the same groups as for the horizontal alignment exercise.  Each group is equipped with a set of setting out tools such as: profile boards, ranging rods, hammer, string line, wooden pegs, line level and chisel.  Prior to starting the exercise explain the expected outputs from this activity, including: (i) checking the line level, (ii) setting out a straight line (iii) measuring existing gradient (iv) establish a new gradient and transfer level to other reference (v) setting out vertical alignment by using for profile boards and set pegs.  Site practice setting out road centre line, set peg and mark the elevation. Try to find out a crag section for the setting out practice.  Each group should discuss and write down site observation from the exercise and once back to the class room each group to present its observations in a plenary. 		

Setting Out - Cross Section		Code: LBT-6d
<p>Learning objective</p> <p>To ensure that the trainees are able to carry out of setting out cross section for roads in mountainous terrain, roads in rolling terrain and roads on embankment by using simple setting out equipment like profile board, ranging rod, line level and measuring tapes.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 	<p>Time: 4-6h</p>	
<p>Trainer's material</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart  A set of setting out tools 	<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>	
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of setting out tools. 		
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will be asked to explain the process of setting out cross sections, and thereafter carry out a practical field exercise near the classroom.</p> <ol style="list-style-type: none"> 1) Draw the following angels on the flip chart: 90°, 60°, 30° and 45°. Ask the trainees to explain how to set out 90° based on their previous practical experience. Conclude to demonstrate how to set out the angels 90°, 60°, 30° and 45° using measuring tapes and then using string line. 2) Explain where the knowledge of setting out 90° can be used in road work and where the angels 60°, 30° and 45° can be used in the road works. 3) Draw road cross section in rolling terrain on a flip chart 4) Explain how to set out the cross section: camber and side drain. Explain step by step and write on the flip chart. 5) Repeat the same for cross sections in mountainous terrain and for embankment. 6) After having demonstrated the setting out for each type out cross section, ask one or two volunteer to re-explain to other trainees 7) Show a mitre drain turnout using power point. Draw on a flip chart and explain step by step on procedure to set out the angel for the mitre drain. 		
<p>Exercise: Field practice Cross Section (outside at Don Bosco football field)</p> <ul style="list-style-type: none">  Use the same groups as for the horizontal alignment exercise.  Each group is equipped with a set of setting out tools such as: profile boards, ranging rods, hammer, string line, wooden pegs, line level and chisel.  Prior to starting the exercise, explain the outputs to be achieved: (i) setting out straight line (ii) setting out three cross sections, one for each road type of 20m length. Fix pegs and 		

strings to show the cross section for each type, ie cross sections for roads in mountainous, in rolling terrain and on embankment.



- ✚ Practice setting out road centre line, elevation and transfer elevation to shoulder and setting road cross section.
- ✚ If there is enough time you may introduce setting out of super elevation and setting vertical crest and setting vertical sag, otherwise these sessions can be introduced during site practice.
- ✚ Each group should discuss and write down site observation from the exercise and once back to the class room each group to present its observations in a plenary.









Introduction of Hand Tools and Equipment		Code: LBT-7
<p>Learning objective:</p> <p>To ensure that the trainees know how to calculate required number and type of hand tools for labour-based road works and type of required equipment/plant. To know good control and management of hand tools and equipment/plant to achieve desired productivity. To ensure that the trainees understand that the quality of hand tools have a direct impact on productivity, to understand the need to provide adequate number of tools on site, to be able to direct the process of hand tool repair, to understand basic tool maintenance activities and to be able to develop and keep records of tools allocated to workers on site.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  A set of basic hand tools (eg, hoe, shovel, pickaxe, axe, hammer, etc.) 		<p>Comprehension level : 3</p>
		<p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides, set of hand tools. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) A full set of hand tools required for labour-based works should be brought to the class room for the explanation and demonstration. 2) Group exercise, where each group lists the number and type of hand tools needed for road construction, and also the type of equipment required. This is done before the demonstration. Post the answer in the flip chart 3) Demonstrate the tools brought and explain the use and the numbers required for labour-based road works. 4) Ask the trainee to explain (repeat) function each type of hand tools. List road construction activities and get trainee to fill down hand tools are required for those activities. 5) In this session it should also be explained of how keep a tool record and how to maintain the tools through simple repairs that can be made on site. Make sure the trainees understand the importance of providing the right tools for each activity in sufficient numbers and of good quality in order to achieve productivity targets. 6) Ask the trainees where they think they can find good quality tools and other equipment for the works, and if they have access to workshops or facilities to provide tools and equipment repair and maintenance. You can provide information of suppliers known to provide good quality tools and equipment. 7) In this session look at productivity of each piece of equipment and recommend what type and capacity of equipment should be used for the different activities. Explain the different options to access equipment, eg purchase, hire-purchase schemes, or hiring (this should be 		







explained for the engineer course).

- 8) Use power point slides to show items and quantities of hand tools and type of equipment that are recommended for the LBT road construction.
- 9) Introduce tools and equipment records for site control.


Exercise










-  Together with the trainees prepare a list of hand tools required and necessary equipment needed for the rural road construction
-  In groups, draw up a plan and control system for management, service and repair of hand tools, operations and planning for effective utilization and equipment movement. Any pre-prepared exercise materials?

Incentive Schemes for LB Works		Code: LBT-8
<p>Learning objective:</p> <p>To introduce the trainees to various payment schemes available. To ensure that the trainees understand of what tasks are and how to arrive at certain task rates. To know the typical productivity rate for various activities, to understand the role of management (supervisors) in setting out production targets and to understand that the standard task rates can be altered and when it is appropriate to alter the rates. Make sure the trainees are able to establish tasks rate and calculate number of labour required for each activity.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 3h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides, standard norm or productivity rate for road construction activities 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Give an example of work that needs to be done, eg to excavate 100 m³ using labourers. Ask several trainees to give difference methods of work to complete the excavation work, and what different payment systems can be used. Note the answers on the flip chart. 2) From the above answer conclude three payment incentives payment scheme can be applied for the labour based road works. 3) From the above example, to discuss and compare advantage and disadvantage of the three incentive scheme for labour based work and recommend an option (Task Work) that is suited for the labour based road work. 4) Explain in theory how the work norm can be established, through time studies. Give the example of road clearing activity. 5) At end of this session to show use power point to shoe presentation of the standard norm for road works. 6) Explain that tasks must be fair, and that they should be reviewed from time to time and that they may differ from site to site depending on the local conditions. Explain that the average worker should be able to complete his or her task in around six hours. 		
<p>Exercise</p> <ul style="list-style-type: none">  Individual exercise: to calculate work norm for excavation of earthwork and ditching side drain. Two trainees to present the result at the end of the exercises  Repeat the same calculation exercise to calculate task rates for as many as possible of other road construction activities  Sample of the exercises are attached in Section 7. 		

Sequence of Construction Activities		Code: LBT-9
<p>Learning objective:</p> <p>To ensure that the trainees understand all operations and activities necessary for the road construction and understand when each operation should be scheduled, how to sequence and balance them, and what input is needed in terms of labour, tools and equipment.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 2h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of sequence of road construction activities. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Ask the trainees to come up with all activities they think are needed for the labour-based road construction. Complete the list of activities and group them in common operations for the labour-based road construction. Write the agreed activities on the flip chart (in no particular order). 2) On the flip chart, draw a table with all the activities listed in the left column. Ask the trainee which activities can be done by labour and what type of hand tools are needed and which activities that cannot be done by labour and what equipment is necessary to support the labour for the labour based road works. Discuss the answers 3) Give the trainees an exercise to suggest the sequence of activities, how they are done and what tools and equipment is required. List the answer in the flip chart 4) At end of this session present the power point slides of graphic of road construction operation and explain in brief the sequence how the operations are carried out, also introduce the concept of balancing work gangs, which will be explained in detail in the following session. 		
<p>Exercise</p> <ul style="list-style-type: none">  To fill the sample on common sequence of road construction activities. Sample of the exercise is attached in Section 7. 		

Management of Labour (Work Organization)		Code: LBT-10
<p>Learning objective:</p> <p>To ensure that the trainees are able to organize the works, calculate the number of labour for each activity, to sequence the work and balance work gangs. To understand that if the sequence is not followed, there are financial losses due to:</p> <ul style="list-style-type: none"> • Inefficiency of operations • Repeat work due to damage of sections completed • Difficulty in quality control due to half completed work <p>To understand that rate of production for different activities can be controlled by gang size, to understand that it is undesirable to change the total number of workers on site regularly i.e. it is better to reassign workers rather than recruit or send workers home for a number of days, to understand that an optimal gang size per activity will keep the desired “gap” between the different activities, to be able to adjust the gang size to achieve desired production rate for each activity</p>		
<p>Participants:</p> <ul style="list-style-type: none"> • Company Supervisors and Engineers 		<p>Time: 4h</p>
<p>Trainer’s material and equipment</p> <ul style="list-style-type: none"> • Training Manual in LBT for Rural Road Construction • Power point slide presentation • Flip chart and projector 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none"> • Power point slides of organization structure. 		
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will do the exercise to calculate labour input and prepare work plan for some activities (Need to check this and also see if this should not be together with roles and responsibilities)</p> <ol style="list-style-type: none"> 1) Ask the trainees who is involved in the site organisation and list on the flip chart. Thereafter, draw a typical site organisation on the flip chart. Explain role and reporting channel of each position. 2) The sequencing of work explained was introduced in the previous session. Use power point slides to again show how to manage the labour in a proper sequence. 3) Explain how to manage recruitment according to the needs, explaining recruitment of labour step by step based work activities 4) Explain how to calculate labour force for each activity and give examples on the flip chart. 5) The trainer needs to draw the attention to a fair and transparent recruitment process, employment conditions, prompt payments and equal treatment of men and women. 		
<p>Exercise</p> <ul style="list-style-type: none"> • Individual exercise: calculate volume earthworks (clearing and excavation, and calculate number of labour) . Sample of the exercises are attached in Section 7. 		

 Group exercise: Give blank format of work plan, to prepare work plan for the earthworks. Sample of the exercises are attached in Section 7. Each group to present the result in the flip chart.








Clearing and Levelling		Code: LBT-11a
<p>Learning objective</p> <p>To ensure that the trainees are able to organise, supervise and control quality of clearing and levelling operations and to calculate number of WDs for these operations. To understand the implications of having non-productive labour, idle equipment, and material waste on company finances.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Work Sheet 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of earthwork construction, (include environmental and safety points on one slide), Work Sheet Clearing Activity 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Ask a question to the trainees: Why do we need to carry out the clearing operation? 2) After receiving the answer, go through all activities step by step with the trainees 3) Explain and write on the flip chart step by step how to carry out each activity: Start from setting out pegging and using sting line. 4) And ask what type of hand tools and quantities need for these activities. 5) Explain how to plan clearing and levelling activity, how to sequence the works, how many workers to recruit, typical task rates depending on conditions. 6) Ask few trainees if anyone know how to remove a big stone from the road width. Give the trainees a tip how to remove the big stone after receiving answer from the trainees. 7) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for clearing activity. 8) Ask trainees if there are any safety of health aspects to consider for this activity. Explain health and safety aspects for clearing activity. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Calculate number of WD for carry out the clearing activities. The trainer gives dimensions of a road section to be cleared.  Calculate number of WD for carry out levelling activities. The trainer gives dimension of a road section.  The trainer can use the task rate that provided to the trainee in the previous session. Each group to present the result in the flip chart. 		








<p>Sample of the exercises are attached in Section 7.</p>	
<p>Construction of Road Formation Code: LBT-11b</p>	
<p>Learning objective</p> <p>To ensure that the trainees are able to organise, supervise and control quality of constructing road formation and side drains in flat, rolling and mountainous terrain. To ensure the trainees know how to calculate earthworks and from the result of the earthwork calculation how to calculate number of wd's required. To understand the implications of having non-productive labour, idle equipment, and material waste on company finances.</p>	
<p>Participants:</p> <p>Company Supervisors and Engineers</p>	<p>Time: 4h</p>
<p>Trainer's material and equipment</p> <p>Training Manual in LBT for Rural Road Construction Power point slide presentation Flip chart and projector Work Sheet</p>	<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <p>Power point slides of earthwork construction and Typical cross section roads in rolling and mountainous terrain and on embankment. (include environmental and safety points on one slide), Work Sheet Earth Works</p>	
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will do the exercise to calculate volume of earth works for the different cross sections and the labour input required for the example provided.</p> <ol style="list-style-type: none"> 1) Use power point slide to show the three types of road cross section. Ask the trainees to suggest where to use the different type of sections. Explain when and where of each cross section is used and why. 2) Ask trainees how to carry out this activity (hand tools/equipment). Explain that in LBT we should aim to minimise earth works by balancing cut and fill. 3) Use power point slides to explain step by step how to carry out each activity. 4) Explain how to plan the forming activity, how to sequence the works, how many workers to recruit, type and number of tools, typical task rates depending on conditions. 5) By end of the explanation ask one volunteer to re-explain construction of road work formation for the three types of cross sections. 6) Give special attention on the building road in rolling terrain. 7) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for forming activity. 8) Ask trainees if there are any safety of health aspects to consider for this activity. Explain health and safety aspects for forming activity. 9) In this session, if time permits, the trainer should introduce road inventory form. This form 	

will link to a session of Pricing of Road work. Sample of the inventory format is attached in Chapter E







Exercise in groups










- ✚ On the flip chart or a power point slide, show a road cross section in rolling terrain in 3-D. Give dimensions and road length. Give norm for excavation of side drain, norm for spreading camber. Calculate: (i) volume of side drain excavation (ii) calculate WDs for side drain excavation (iii) calculate WDs for cambering
- ✚ Provide a separate calculation exercise on cut and fill cross section by showing the cross section of the power point slide.
- ✚ Sample of the exercises are attached in Section 7.
- ✚ The trainer can use the task rate that provided to the trainee in the previous session. Each group to present the result in the flip chart.









Compaction of Earth Works		Code:LBT-11c
<p>Learning objective:</p> <p>To ensure that the trainees understand the importance of compaction and how to supervise and control the compaction. To understand that keeping roller and water truck idle waste on company finances.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 4h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of earthwork construction 		
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will do the exercise to calculate the number of rollers required for the compaction and the amount of water required to achieve optimum moisture content</p> <ol style="list-style-type: none"> 1) On the flip chart draw soil particles and explain the composition of soil. Explain why soil needs to be compacted and difference of compaction in dry and moist conditions 2) Ask trainees how compaction can be done, and write down on the flip chart. Ask which method they think is the most appropriate for the labour based road work in term of quality and economy. 3) Provide information on the use of pedestrian roller and why it is an appropriate compaction equipment for the Labour based method, and how the road should be compacted. 4) Explain how to calculate quantity of water to achieve OMC (Optimum Moisture Content) for compaction 5) Explain how to do testing a road section for compaction in order to calculate number passes with the available roller. 6) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for forming activity. 7) Ask trainees if there are any safety of health aspects to consider for this activity. Explain health and safety aspects for forming activity. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Give number of labour to spreading camber, work norm of spreading camber, norm of roller. Calculate number of rollers needed for this activity (should not be included or to include in laterite spreading).  Calculate the amount (quantity) of water to spread on a road section of 100m length, 4m width and with a thickness of 0.15cm. 		









 Sample of the exercises are attached in (this exercise to be developed)	
Quarry Preparation, Loading and Off Loading	
Code:LBT-12a	
<p>Learning objective:</p> <p>To ensure that the trainees are able to (i) identify and exploit a gravel quarry (ii) manage gravel stockpiling, loading and off loading (iii) calculate the quantity of gravel to be off loaded and the distance between the off loading points. To understand the implications of having non-productive labour, idle equipment or under use of equipment capacity waste on company finances.</p>	
<p>Participants:</p>  Company Supervisors and Engineers	<p>Time: 2h</p>
<p>Trainer’s material and equipment</p>  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector	<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p>  Power point slides of quarry preparation, loading and off loading gravel (include environmental and safety points on one slide). List of norm for off loading gravel, Work Sheet for Quarry Operations	
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers. After the topic has been introduced trainees will do the exercise to calculate the amount of gravel needed and the distance between the off loading points</p> <ol style="list-style-type: none"> 1) Ask the trainees and explain activities in the preparation of the quarry before loading commence, like: setting out bordering the quarry, bush clearing, removal of top soil, etc 2) Explain the importance of good and approved gravel for the road surface. Explain how to prep the quarry (or borrow pit). Explain that the quarry or borrow pit has to be restored when work has been completed. 3) Draw on the flip chart how to stockpile and load gravel, and which option is right and which wrong. 4) Explain which hand tools to be used for loading gravel manually. Provide norm for loading gravel, and explain how haulage methods will depend on the distance. 5) For off loading gravel: Show a cross section using the power point. Explain step by step for loading of gravel. 6) The trainer, together with the trainees, calculate distance for off loading gravel of one truck shown in the power point slide. Trainees will thereafter do the exercise on their own. 7) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for forming activity. 8) Ask trainees if there are any safety of health aspects to consider for this activity. Explain health and safety aspects for forming activity. 	
<p>Exercise in groups</p>  Calculate the distance between offloading points for a truck by giving capacity of the truck,	







thickness of gravel to be spread and width of the road. Sample of the exercises are attached in Section 7.

Hauling of Gravel		Code: LBT-12b
<p>Learning objective:</p> <p>To ensure that the trainees are able to calculate spacing of each hip of gravel along the road that transported by a truck and to calculate number of trip for each truck can be transported for one day work.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 3h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of graveling. List of norm for off loading gravel 		
<p>How is this topic conducted</p> <p>In this session the trainer needs to give as many exercise as possible</p> <ol style="list-style-type: none"> 1) Show the power point slide of gravel hauling. With the trainees to go through the example of al culation gravel hauling distance. 2) Group exercise: of the example to do exercise in group. 3) The group representative to show result of the exercises. 4) At end of this session give table of hauling norm of each difference type of trucks. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  		

Construction of Gravel Wearing Course		Code: LBT-12c
<p>Learning objective:</p> <p>To ensure that the trainees are able to organize, supervise and control quality the gravel surfacing activities and to calculate number of WDs for each activities and work force for the graveling works. To understand the implications of having non-productive labour, idle equipment, and material waste on company finances.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 3h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Work Sheets 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of graveling (environment and OSH points). List of norm for off loading gravel, Work Sheet Gravelling 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) On a flip chart draw road cross section showing settle in wheel track after transporting the gravel. And show a 3-D road cross section in power point slide. 2) With the trainees, explain gravelling operation start from reshaping the road and compaction of the base (repetition) and then how to load and transport the gravel from the quarry and off load, spread, water and compact the gravel layer. 3) More precisely explain the steps of setting out and set string line for spreading gravel 4) Explain the compaction again step by step. 5) Give an example of how to calculate labour force (WDs) by giving norm as discussed previously. 6) Ask the trainees that which hand tools are needed for this operation. 7) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for gravel wearing course. 8) Ask trainees if there are any safety of health aspects to consider for this activity. Explain health and safety aspects for gravel wearing course. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  To complete gravel wearing course of 2 km. Calculate number of WDs and number of trucks needed for transporting gravel .  Hauling distance 18 km, truck capacity 4m³, prepare work plan to finish the work within 2 months. Calculate number of labour to complete this operation.  Sample of the exercises is attached in Section 7. 		





 Together with the trainees to develop the quality control system for the gravel spreading	
Simple Gravel Testing (Settling Test)	
Code: LBT-12d	
Learning objective: To ensure that the trainees understand the composition of a good gravel material and they are able carry out simple field test of proportion of gravel prior to accepting the gravel quarry.	
Participants:  Company Supervisors and Engineers	Time: 1h
Trainer's material and equipment  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  A few gravel in a bottles and water, ruler and calculator.	Comprehension level : 2 General methodology: Class room and field practice
Hand out  Power point slides of graveling. gravel envelope, field test	
How is this topic conducted <ol style="list-style-type: none"> 1) On the flip chart draw a laboratory glass for testing the gravel. Step by step explain how to carry out the settling test. 2) Ask one or two training to repeat the testing method. 3) Ask the training when this test to be conducted 4) Explain what happen if the gravel does not have the right composition (eg too many fines or too few fines, oversize stones etc) 5) After this test explain another simple of bowling test of moisture contain in the flip chart. Repeat the same method by asking one or two trainees o re-explain of the method. 6) Ask the trainees when this test should be conducted. 7) Give an example if too much moisture what happen after the compaction. Ask if too dry what will happen after compaction. Fund out the reason. 8) Ask one or two trainees to re-explain the above two methods 	
Exercise in groups  Have a bottle with gravel and water prepared for each group. After settling ask trainees to calculate the percentage of the various layers. Ask one group to demonstrate their with their sample how they do the calculations. Conclude whether the gravel is suitable for road works	









DCP Testing - Field Practice		Code: LBT-12e
<p>Learning objective:</p> <p>To ensure that the trainees understand the importance of compaction and able carry out the Dynamic Cone Penetrometer (DCP) test of the compaction. To understand that fail on compaction test will result of re-compaction of the failed section.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Report of DCP test of a road completed by TIM Works  A set of DCP instrument, 		<p>Comprehension level : 2</p> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides, table for recording DCP field test result, graph for converting the result of the DCP to CBR. 		
<p>How is this topic conducted This session is introduced as a field exercise.</p> <ol style="list-style-type: none"> 1) Explain standards for compaction the use of CBR and how the DCP can be used as a proxy 2) Explain the use of the DCP for layer testing and the pattern of testing and how to convert to CBR. 3) Demonstrate the DCP instrument and explain the function of each part of the instrument. 4) Show the table for the DCP test 5) Show the formula to calculate the CBR. Show and explain the table for convert the CBR. Prepare a few examples for converting the DCP result to the CBR and ask trainees to repeat the exercise by giving difference DCP testing result. 		
<p>Exercise: Field Practice (outside at Don Bosco football field)</p> <ul style="list-style-type: none">  Divide the trainees into groups of 4-5 people. Each group will do the field test and fill in the DCP table (sample of the table is attached Chapter D code No# 23.). Each group to convert the DCP result to CBR by using formula and than using graphic for the CBR calculation 		







Construction of Base Course		Code:LBT-13
<p>Learning objective:</p> <p>To ensure that the trainees are able to organise, supervise and control quality of road base course operation and understand of various type road surfacing options. To understand the implications of having non-productive labour, idle equipment, and material waste on company finances.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 2h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Work Sheets 		<p>Comprehension level : 3</p> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of base course construction (environment and OSH points), Work Sheet Base Course 		
<p>How is this topic conducted Ask trainees to give examples of different types of road surface paving options and write the answer on the flip charts. Provide a brief explanation of each of the paving options listed (list all common if not identified by the trainees) their uses and function. Explain which ones may be more suitable for rural road contraction.</p> <ol style="list-style-type: none"> 1) Show different pavement options for rural roads on the power point of. Explain function and uses for each of the difference type of surfacing. (including Penetration Macadam and Latasir) 2) Explain that all surfacing types need to have firm road base course to support the surface 3) Ask trainees to give examples of different road base courses and their functions and write the answer in the flip chart. Provide a brief explanation of each of the base courses relevant to rural road construction their uses and function. Explain which ones may be more suitable for rural road contraction. 4) Show power point pictures of some different road base course, such as Latasir and Telford, and explain that we are using different size materials to complete the base course. Show the picture of base use steel shutter system for spreading the base course. Explain that alternative to have materials supplied from the crushing plant is to crush manually or to find natural materials of different sizes locally. 5) Explain step by step how to construct the base course using different sizes of stone, and base course using crushed aggregate from stone crusher. 6) Explain how the quality control is carried out before during the after the activities is carried out (this sample can be taken from Work Sheets). 7) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for road base course. 8) Ask trainees if there are any safety of health aspects to consider for this activity. Explain 		







health and safety aspects for road base course.








Exercise in groups







-  Calculate road base course material by giving dimension of the layer to be constructed.
-  Calculate number of WD required of 2 options of the base course.
-  Sample of the exercise is attached in Section 7.
-  Together with the trainees to develop the quality control system for the construction of base course.









Prime Coat and Penetration Macadam		Code: LBT-14
<p>Learning objective:</p> <p>To ensure that the trainees are able to organise, supervise and control quality of Prime coat and Penetration Macadam (PenMac) road surface operation. To understand the implications of having non-productive labour, idle equipment, and material waste on company finances</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 2h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Work Sheets 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of base course construction and Work Sheet 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Ask few trainees if they know what a prime coat is and why it is used. Write the answer on the flip chart 2) Use the power point to show pictures of prime coat activities from ILO road works' in Indonesia and explain the two types of prime coats, which are emulsion and cut back. 3) Explain step by step of construction the prime coat based on the Work Sheet and power point slides 4) Show how to calculate the amount of bitumen for the prime coat 5) Ask the trainees if they know what the Penmac is. Show Pictures of Penmac activities from ILO Road project in Indonesia 6) Explain step by step how to construct the Penmac. Use the Work sSeet for the explanation 7) Explain how to control temperature when heating asphalt 8) Exercise to calculate each type of material for Penmac: (aggregate, bitumen) 9) Same procedure (from 5-8) apply for construction of Latasir. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Calculate the amount of aggregate and bitumen needed for the example given.  In this session it is important that together with the trainees to develop the quality control system for the construction for Penmac activity. 		





Drainage		Code:LBT-15a
<p>Learning objective:</p> <p>To give the idea for the trainees on different type of drainage for the road construction. Make sure they know where and when to use the different type of road drainage structures.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 2</p> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of pictures 		
<p>How is this topic conducted The trainer will introduce the concept of drainage and why drainage is important for rural road construction.</p> <ol style="list-style-type: none"> 1) Ask participants what type of drainage they can identify 2) Write the identified types of drainage on the flip chart and number them. Make sure all have been identified. In groups, identify road drainage structures and present the results of the exercise 3) Use power point to show pictures of each type of drainage. 4) Trainer to explain and make correction of the result of the exercises. To explain when and where to construct each type of drainage structures. Write step by step of an explanation. 5) If time permit to get one or two trainees to re-explain this session. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Write name of drainage structure on a blank road pre-printed drawing (sample of the blank drawing is attached in Section 7. 		








Side Drains, Mitre Drains, Scour Checks		Code:LBT-15b
<p>Learning objective:</p> <p>To ensure that the trainees understand the importance of drainage along the road and are able to organize, supervise and control quality of the side drain, mitre drain and scour checks construction.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides and pictures. 		
<p>How is this topic conducted The trainer will start this session as a lecture and encourage interaction through questions and answers.</p> <ol style="list-style-type: none"> 1) Show the 3-D pictures in the power point slide. 2) Explain the function of the side drain, which has already been construction during formation works. Also explain the limitations and the need to introduce scour checks and mitre drains 3) Explain when and where the scour check and the mitre drains are constructed. 4) Write a step by step explanation of how to construct the scour check on the flip chart. Start with determining the requirements and setting out. 5) Write a step by step explanation of how to construct the mitre drain on the flip chart. Start with determining the requirements and setting out. 6) Using power point, show tables of the number of the scour checks and mitre drain needed based on the terrain. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Write name of drainage structure on a blank road pre-printed drawing (sample of the blank drawing is attached in Section 7. 		







Introction of Concrete Works		Code: LBT-16a
<p>Learning objective:</p> <p>To ensure that the trainees know how concrete works and how it can be mixed. The trainees are able to calculate quantities of materials for concrete works and know how to carry out testing concrete: like slump test and compression strength test and simple field test like: spade test...</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of concrete and stone masonry works. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Explain the definition of concrete and composition of concrete. Draw a diagram of proportion of concrete mix on the flip chart 2) Explain different qualities of concrete based on mixing proportion. When and when to use each type of the concrete. 3) Show the power point slides the material quantity based on proportion. 4) Discuss reinforcement in concrete and why this is necessary 5) If time permit to calculate how the norm is calculated (for engineer course). 6) Explain the importance of curing and reason for the curing. <p><i>It is also important to link this session the technical specification. To explain in detail on method of construction and quality control</i></p>		
<p>Exercise in groups to calculate material for mixing a concrete structure. Each group to present result of the exercise.</p> <ul style="list-style-type: none">  Additional exercises of calculation weight of the steel. Giving density of some necessary material.  Sample of the exercise is attached in Section 7. 		

Introduction of Stone Masonry Works		Code: LBT-16b
<p>Learning objective:</p> <p>To ensure that the trainees know what stone masonry is where it can be used. The trainees are bale to calculate required material for the stone masonry works and know how to conduct quality control of the work. Know how to carry out simple field test for mortar mixing like: spade test....</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <p>General methodology: Class room and field practice</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of concrete and stone masonry works. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Explain what stone masonry is and the composition of the stone masonry. Explain the difference between dry stone masonry and ordinary stone masonry 2) Shows in power point slide on different types of cement mortars, function of each type of the cement mortar 3) Explain how to calculate mortar and quantity of cement of each type of mortar. 4) Explain what quality and size of stones should be used 5) Show on the power point slides how the stone be placed for the stone masonry works 6) Show on the power point slide how to construct stone masonry <p><i>It is also important to link this session the technical specification. To explain in detail on method of construction and quality control</i></p>		
<p>Exercise in groups To calculate quantities of material to be used for stone masonry wall.</p> <ul style="list-style-type: none">  The group representative to present the result of the exercise and explain how it is calculated. Sample of the exercise is attached in Section 7 		









Construction of lined drain, culvert and gabion		Code: LBT-17
<p>Learning objective:</p> <p>To ensure that the trainees are able to organize, supervise and setting out and control quality of the construction of lined drain, culvert and gabion work. To know how to calculate labour cost for sub-contracting to skill labour.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 	<p>Time: 3h</p>	
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 	<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room and field practice</p>	
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of construction of lined drain, culvert and gabion 		
<p>How is this topic conducted</p> <p>Construction of stone masonry lined drain:</p> <ol style="list-style-type: none"> 1) Explain function of the lined drain. Shown in drain of lined drain design. 2) Step by step explain how the lined drain is constructed start of setting out. Ensuring top level of the lined drain is not higher than level of the road shoulder 3) Explain how to do quality control especially mixing of mortar. 4) Explain how to calculate labour cost. This taken from unit rate analyse on labour cost. 5) Together with the trainee to calculate labour cost as example. <p>Construction of culvert and gabion: follow the above training technique of construction of lined drain.</p> <p><i>It is also important to link this session the technical specification. To explain in detail on method of construction and quality control</i></p>		
<p>Exercise in groups to calculate labour cost for</p> <ul style="list-style-type: none">  1 m of stone masonry lined drain  1 culver of size 60 cm x 60 cm x 5 m  1 m3 of gabion work. 		







Introduction of Bioengineering		Code: LBT-18
<p>Learning objective:</p> <p>To ensure that the trainees are aware of what is bio-engineering, function of the bioengineer, where and when to use and bio-engineering technique. To introduce on how to construct the importance items of the bio-engineering like: grass planting, brush layer, live check damp, bamboo protecting and sub soil drain etc.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 3h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 3</p> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of bio-engineering 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Ask question in general what is bio-engineering. Note the answer in the flip chart 2) Show in project of prepared power point slide of what is bio engineering and function 3) Explain one by one of the above importance bio-engineering on: function, where to apply, method of construction 4) At end of the session distribute the pre-printed hand of power point slide of bio-engineering 		
<p>Exercise: NA</p>		











Work plan		Code: LBT-19
<p>Learning objective:</p> <p>To ensure that the trainees know how to prepare the work plan in order to complete the work in the desire duration. To understand the typical use of common equipment, labour and material used on road construction sites, to understand the need and better manage site equipment, labour and material to be able to make work plans that balance of all activities based available resource.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer’s material and equipment</p> <ul style="list-style-type: none">  Training Manual Tender Process and Pricing for Rural Road Construction  Power point slide presentation  Flip chart  Blank and filled work plan, list of equipment and list of personnel and work method. 		<p>Comprehension level : 2</p> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Blank work plan form and a filled work plan. List of personnel, list of equipment and blank form of method of road construction. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Show in power point slide and explain step by step how the prepare work plan, labour plan and equipment plan. 2) Give the blank form of work plan to the trainees and show in the projector of blank work plan. With the trainee to fill the work plan two work items and ask one or two trainees to fill the rest of the plan (group exercise to fill the rest of the form and each group to present the result) 3) Give the blank form of list of equipment, personnel and work method. Show in the projector and explain how hoe the form to be filled. If time permit get one or two trainees to re-explain how the fill the form. 4) To emphasize more on how to manage equipment compare to equipment plan as well as well manage labour compare to the labour plan. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Distribute blank form of work plan, equipment plan and labour plan. Together with the trainees to fill one or two items then the trainees to fill as exercise. 		








Role of Engineer, Supervisor and Gang Leader		Code: LBT-20
<p>Learning objective:</p> <p>To ensure that the trainees understand the role of the engineer, supervisors and gang leader include roles of director and client. A brief introduction to the concept of contracts and how it forms a relationship between the client and the contractor. To introduction to the internal organisation of the contracting company, to ensure the director understands why it is important to have qualified technical staff to successfully deliver on contracts, to ensure that the trainees understand that effectively delivering on their role is important for successful contact delivery.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer’s material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector 		<p>Comprehension level : 2</p> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of roles of site supervisory staff. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Group discussion. Each group to find out job description of engineers, supervisors and gang leaders. The group present the result in plenary. 2) From the result of the discussion to write down on the flip chart and conclude 3) Shows in the power point slide on job description of those staff and compare to the result of the trainees. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  ??? 		






Site Administrative Forms		Code: LBT-21
<p>Learning objective:</p> <p>To ensure that the trainees understand the purpose of all administrative forms like:</p> <ul style="list-style-type: none"> • Daily Site Plan <ul style="list-style-type: none"> - Understand the level of detail on the daily plan for labour force - Understand that the daily plan is done every day for the following day - Understand how to calculate production rates needed to maintain optimal output of different activities • Muster Roll <ul style="list-style-type: none"> - Understand the importance of muster role and it forms the basis for computation of wage etc. - It is a record of payment made to labourer - Understand that the muster roll is done every day for the following day • Other forms to be fully familiar with, be able to use and know the importance of other forms e.g. store records, equipment log sheet, tools records, employment registration form, fuel records, material delivery sheet 		
<p>Participants:</p> <ul style="list-style-type: none"> ✚ Company Supervisors and Engineers 		<p>Time: 4h</p>
<p>Trainer’s material and equipment</p> <ul style="list-style-type: none"> ✚ Training Manual in LBT for Rural Road Construction ✚ Power point slide presentation ✚ Flip chart and projector ✚ The administrative forms. 		<p>Comprehension level : 2</p> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none"> ✚ Administrative Forms: (i) daily plan and report (ii) weekly report (iii) monthly report (iv) muster payroll (v) tools stock record (vi) fuel stock and fuel distribution record (vii) equipment log sheet (viii) Workers Registration Form and Muster roll and 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) To show blank forms in projector and also give hand out of the blank forms to the trainees. 2) Together with the trainees fill all the daily report and plan of two items. 3) Group exercise to fill other items of the daily report form. 4) Repeat same procedure to other forms 		
<p>Exercise in groups</p> <ul style="list-style-type: none"> ✚ Fill in the forms 		


Recruitment of Labour		Code:LBT-22a
<p>Learning objective:</p> <p>To ensure that the trainees know process of recruitment of labour and understand labour regulation. To be fully aware of key legal issues such as gender equality, employment of youth, providing equal opportunities to disabled people, contract between employer and employee, explain wage payment system at recruitment stage. Be able to explain the concept of labour-based employment to communities (short term employment on road in vicinity of their homes, type of work, safety systems on site, payment system, other communities will be employed as work moves to other areas etc.).</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Workers Registration Form  Muster Roll 		<p>Comprehension level : 2</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of recruitment of labour. Workers Registration Form and Musterroll and 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Show power point slide and together with the trainees go through objective of the client, how to announce of recruitment of labour, in what consideration for recruitment of labour. 2) Ask in general if any trainee has experience recruiting labour. Note the answer in flip chart. 3) Show in power point slides with the trainees go through the employment of women. How to employ the women labour? 5) To mention of equal wage and equal work man and women 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  NA 		

Establishment of Site Camp		Code: LBT-22b
<p>Learning objective:</p> <p>To ensure that the trainees know how to identify the site for the camp and what should be included in the camp structure and basic thing to be equipped in the camp. Understand environmental considerations after demobilizing the camp.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and [projector 		<p>Comprehension level : 2</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of recruitment of labour(environment and OSH),. 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Group discussion. Ask the group find out what are necessary thing needed for the site camp 2) Each group representative to show the answer on the flip chart 3) Ask trainees if there are any environmental aspects to consider for this activity. Explain environmental aspects for site camp. 4) Ask trainees if there are any safety of health aspects to consider for this activity. Explain health and safety aspects for site camp. 5) The trainer to compare the answer with the guide line on the power point slide and conclude 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  Identify location and suggest what is necessary for a site camp along a 7km road construction project. 		

Social Safeguard		Code: LBT-23
<p>Learning objective:</p> <p>To ensure that the trainees are full aware of social safeguard in consideration during the construction. To be aware of specific contractor obligations listed in contract related to social safeguards e.g. gender equality, cognisance of needs of disabled employees, HiV/Aids Awareness, Environmental issues, Occupational Health and Safety, provision of facilities such as (first aid, safety gears, workers insurance etc). To understand that social safeguards apply at all times throughout the duration of the contact. To understand that possible implications for non-compliance can be serious including, worker discontent, legal action against contractor, client terminating contract etc.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 2h</p>
<p>Trainer’s material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Environmental Check List  OSH Check List 		<p>Comprehension level : 2</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Power point slides of cross cutting issues.  Environmental Check List  OSH Check List 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Ask the trainees to think of environmental issues during road construction and after road construction before demobilization of works and list those on the flip chart 2) Ask the trainees to think of OSH issues during road construction and after road construction before demobilization of works and list those on the flip chart 3) Compare with the prepared power point slide. 		
<p>Exercise in groups</p> <ul style="list-style-type: none">  N/A 		

Post-Test		Code: LBT-24a
<p>Learning objective:</p> <p>A Post Test should be carried out to test knowledge of the trainees at the end of the class room training. This test should be the same as the Pre Test and trainees should be given the same amount of time to answer the questions. Asking the same questions before and after the training will provide a measure of (i) the current level of understanding and (ii) the increase in knowledge of the subject matter.</p>		
<p>Participants:</p> <ul style="list-style-type: none">  Company Supervisors and Engineers 		<p>Time: 1.5h</p>
<p>Trainer's material and equipment</p> <ul style="list-style-type: none">  Training Manual in LBT for Rural Road Construction  Power point slide presentation  Flip chart and projector  Post-Test 		<p>Comprehension level : 3</p> <hr/> <p>General methodology: Class room</p>
<p>Hand out</p> <ul style="list-style-type: none">  Post-Test 		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) Explain that the result of the Post Test is used as part of the overall assessment of the trainees, which is a combination of the Post Test score, assessment of the trainee in the class room and during the field practice. 2) The Post Test questions should be handed out to the trainees individually. Give the trainees 1.5 hours to answer the questions (same as Pre Test). 		
<p>Exercise</p> <ul style="list-style-type: none">  Post-Test is included in Annex 2 		

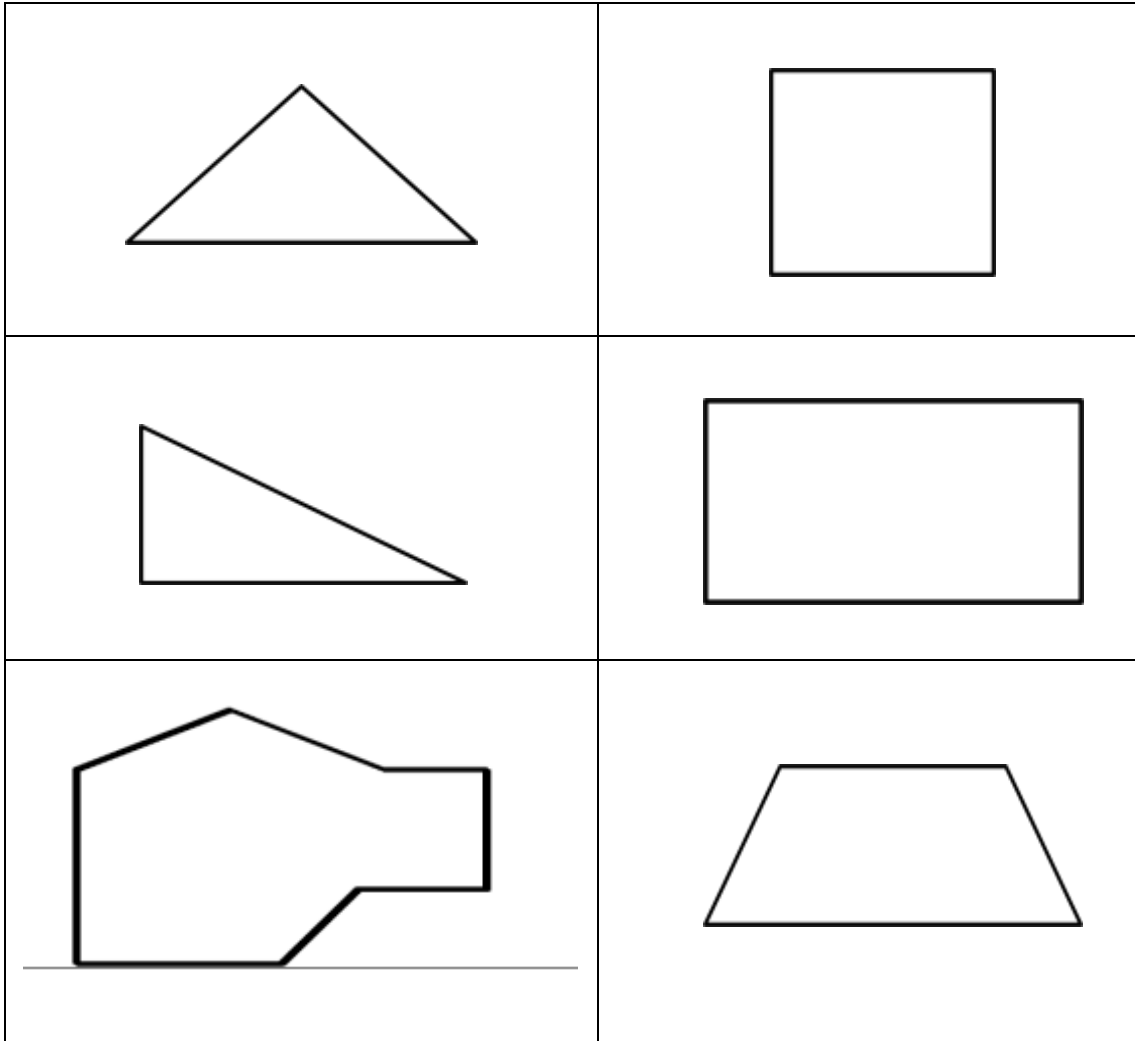
Course Assessment		Code: LBT-24b
<p>Learning objective:</p> <p>It is important that there is an evaluation of the training to ascertain whether it has been useful or not. This session will provide an opportunity for the participants to provide feedback</p>		
<p>Participants:</p> <p> Company Supervisors and Engineers</p>		<p>Time: 1h</p>
<p>Trainer's material and equipment</p> <p> Flip chart and projector</p> <p> Course Evaluation Form</p>		<p>Comprehension level : 3</p> <p>General methodology: Class room</p>
<p>Hand out</p> <p> Course Evaluation Form</p>		
<p>How is this topic conducted</p> <ol style="list-style-type: none"> 1) In this session the expectations can be revisited to see if the training has covered them or if indeed the training has been very different from that which was anticipated. 2) Give the trainees a copy of the evaluation form and encourage them to fill in properly as this is important for future training. The trainees can chose if they want to put their name or fill it in anonymously. Collect the evaluations and keep for compilation. 		
<p>Exercise</p> <p> Course Evaluation a sample in Annex 3</p>		

Course Closure	Code:
<p>Learning objective</p> <p>At the end of the class room training before closure it is important to revisit the expectation submitted by the training before the starting of the training, to sum up the class room training and to inform about the practical training.</p>	
<p>How is this topic conducted</p> <p>Compare the expectation and training topics that have been conducted.</p> <p>Provide your feedback to the trainees, and explain again the methodology for the assessment and the requirements to attain the certificate</p> <p>All persons who have attended should be thanked including any guests or officials, and the class room training closed.</p>	
<p>Exercise</p> <p> N/A</p>	

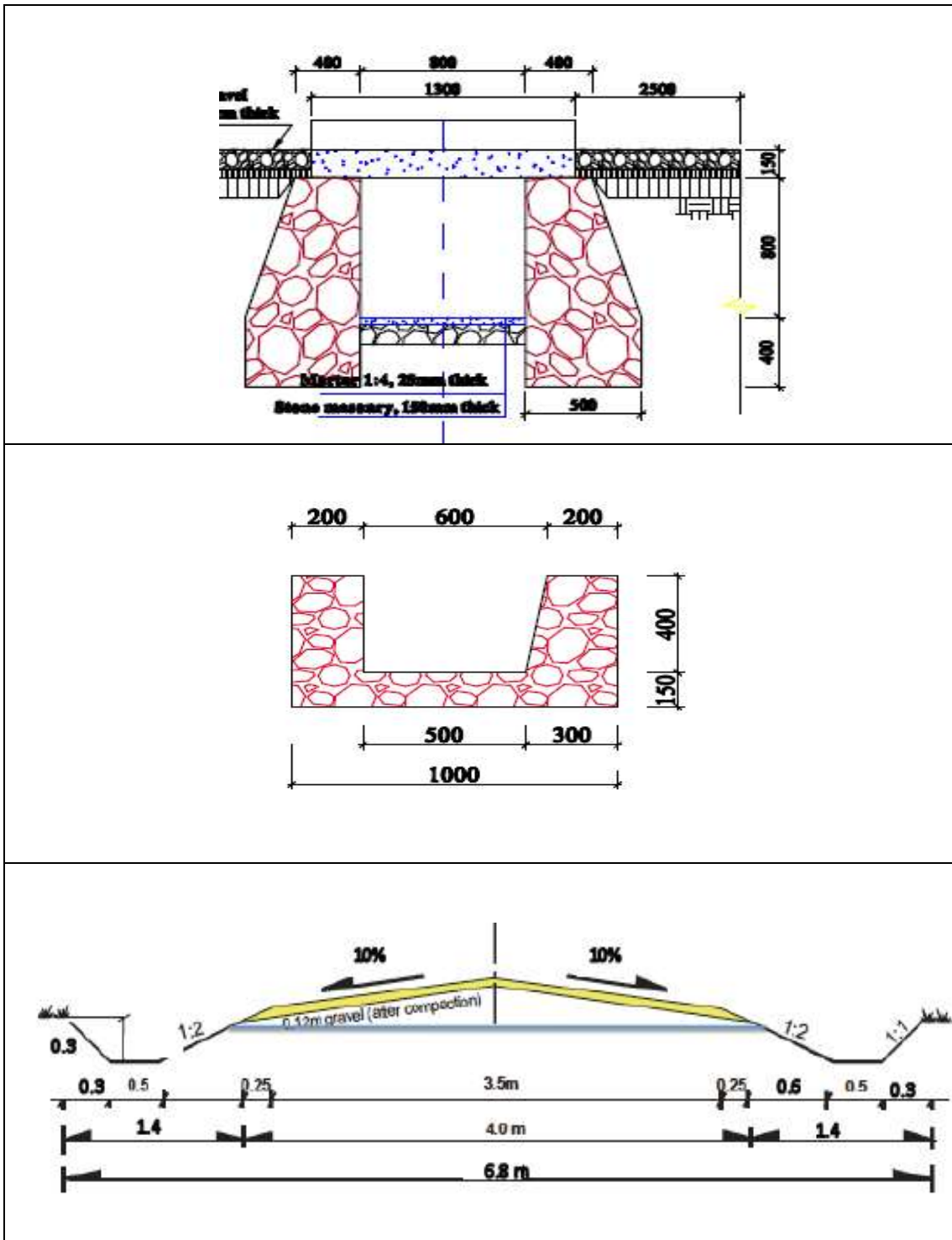
8 Exercises

Exercise Code:LBT-3: Review of Geometry

1 Calculate the area for the following geometric shapes (use different dimensions)



2 Calculate the area of these structures



3 Convert the following table

Relationship between the various units or lengths

	mm	cm	m	Km
1 mm				
1 cm				
1 m				
1 km				

Relationship between the various units or areas

	mm ²	cm ²	m ²	km ²
1 mm ²				
1 cm ²				
1 m ²				
1 km ²				

Relationship between the various units or volumes

	mm ³	cm ³	dm ³	m ³
1 mm ³				
1 cm ³				
1 dm ³				
1 m ³				

Exercise Code: LBT-4: Choice of Technology

Group exercise where trainees discuss technology options and determine which options would be more suitable in their situation.

Think about the following issues:

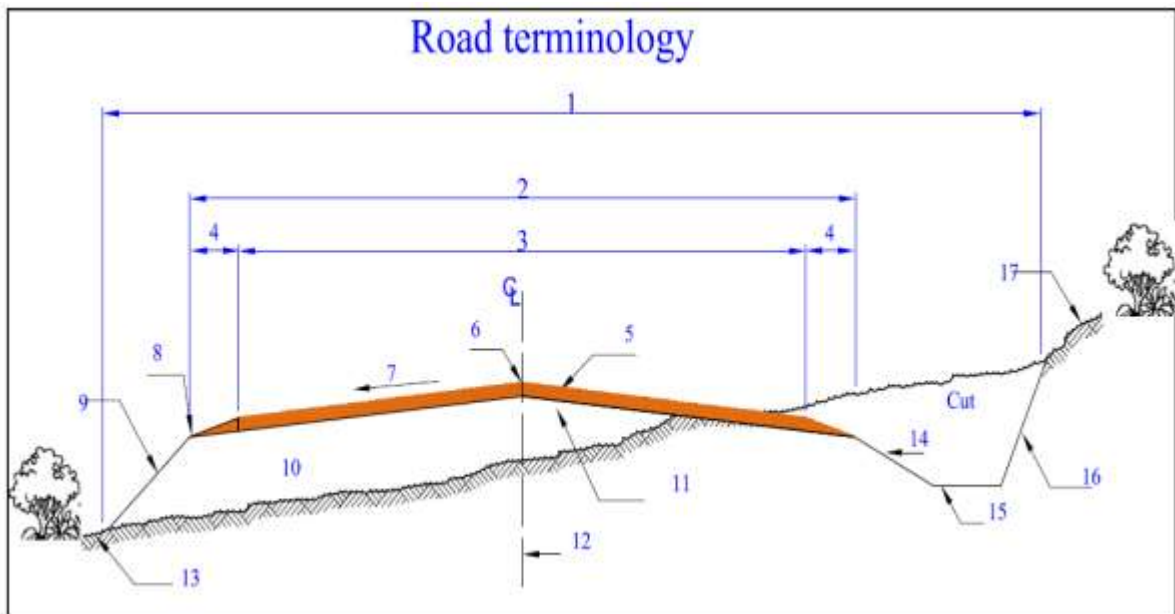
- *What is my financial situation?*
- *Can I afford to buy equipment?*
- *Can I get a bank loan to buy equipment, and if so would I be able to pay back on time?*
- *Will I be able to utilise my equipment in an economical way? will I have enough work?*
- *What if there is a breakdown? Can I easily get spare parts for my equipment?*
- *Would it be possible to carry out most activities without heavy equipment?*
- *Can I find labour willing to work on the road?*
- *Can I buy handtools locally? Can I afford to buy handtools?*
- *What is more economical for me, using machines or using local resources*

What are the advantages/disadvantage of using local resources?

What are the risks/benefits of relying on heavy equipment?

Summarize your argument why you would prefer one option over the other

Exercise Code: LBT-5: Road Terminology



Put the correct term in the road cross section above

Road terms	
Embankment fill	Formation width
Original ground level	Road carriage way
Road centre line	Road way
Back slope	Crown
Side drain	Shoulder
Ditch slope	Camber
Shoulder break points	Road formation
Gravel wearing course	Cut

Exercise Code: LBT-7: Incentive Payment Scheme

GROUP EXERCISE: INCENTIVE PAYMENT SCHEME

Calculate work norm for the following work items?

1. A group of 14 workers carried out excavation of site drain activity. The group completed 100 m side drain(1 side) in 1 day (8 hours). Calculate work norm of side drain excavation.

2. Another group of 21 workers carried out cambering activity. The group completed 100 m of the cambering work in 1 day (8 hours). Calculate work norm of cambering activity.

3. Embankment h=0.5 16 workers L= 12m 1 day

4. Clearing w=8.8 8 workers L= 150 1 day

5. Spreading gravel thick=0.12 w=3.5 12 workers L=110m 1 day

Need to make clearer!

Exercise Code: LBT-11: Construction of Earth Works

Group exercise to calculate wd's for clearing and leveling

We are planning to construct 4.0 km road. The entire road length needs to be cleared of full width.

1. Calculate the number of wd for the clearing activity using the task rate given in the previous exercise (No 10)
2. The engineer has estimated that the volume of road leveling is 625 m^3 . Calculate the number of wd for the leveling activity using the task rate given in the previous exercise (No 10).
3. The engineer decided to employ 19 workers to carry out these activities. Calculate the number of days to finish the works and prepare a work plan to complete the two activities

Group exercise for eart work calculation

We are planning to construct 4.0 km road. The road cross section of the first 2.0 km is assessed as Type 1 and the rest as Type 2.

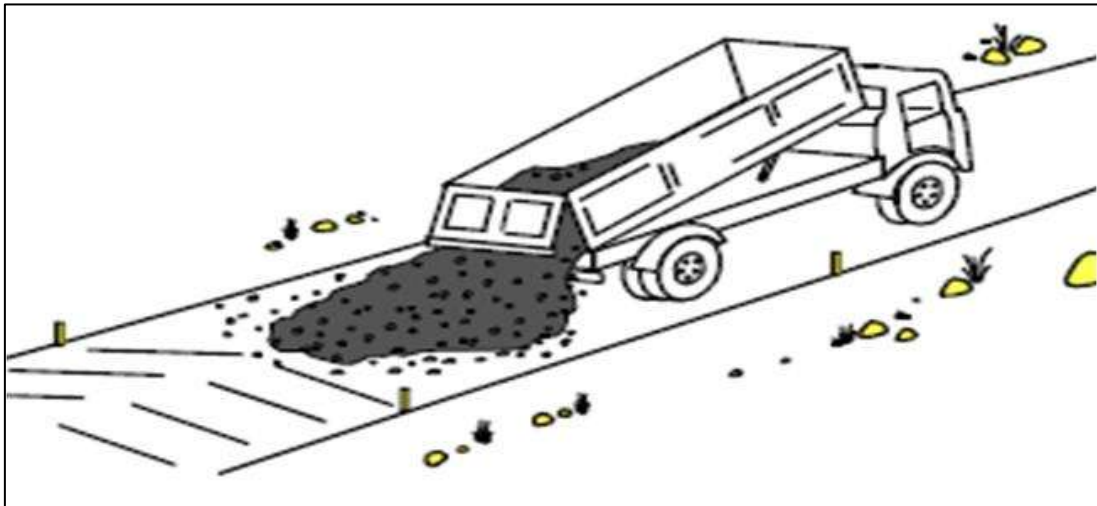
1. Calculate the volume of side drain excavation of Type 1 and volume of camber filling
2. Calculate volume of cutting and side drain excavation of Type 2 and volume of filling + camber filling
3. Calculate the number of wd's for each Type of road cross section

Exercise Code: LBT-12: Gravelling

Group exercise off loading of gravel

Calculate the distance between off loading points if:

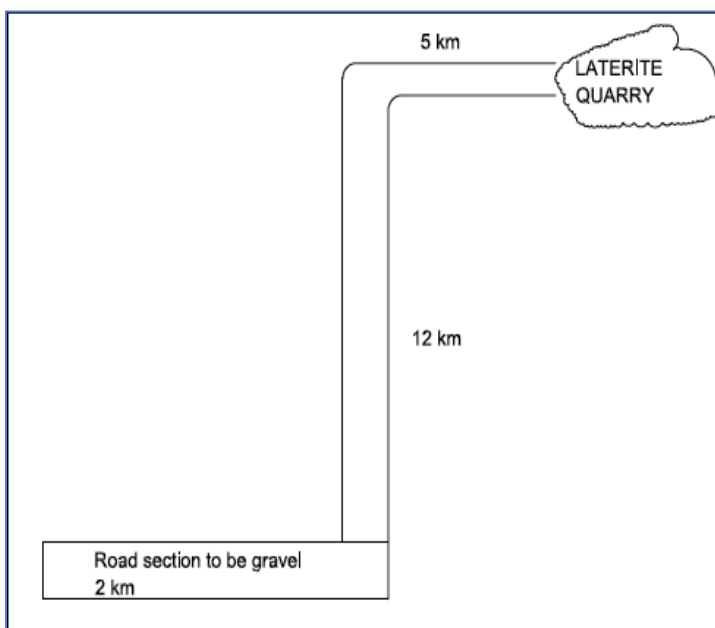
- a) Capacity of truck is 4m^3
- b) Width of road carriageway to be graveled is 3.5 m, compacted thickness is 12 cm



Exercise Code: LBT-12: Gravelling

A road gravelling site needs 150 m³ of gravel each day. The hauling distance from the quarry as shown in the sketch below. It is assumed that the speed of the truck is 20km/hour with gravel loaded and 30 km/hour with an empty truck. The capacity of the truck is 4m³. Working hours 8 hours daily with 1 hour lunch break

1. Calculate the average hauling distance for transporting the gravel
2. Calculate the number of trucks needed each day to carry the daily requirement of gravel



Example:

The calculations below describe how to estimate the required amount of trucks required for the daily supply of 150 cubic metres of gravel with an average hauling distance of 20km.

The following estimates are made for travel speeds, loading, un-loading and manoeuvring:

Travel speeds	good road		bad road	
	with gravel	empty	with gravel	empty
	40 km/h	60 km/h	10 km/h	20 km/h
Loading	7 minutes ¹		Unloading	8 min. ²
Manoeuvring	at the quarry: 3 min.		at the work site: 10 min.	

Remarks: 1) Loading carried out by front wheel loader 2) Assuming self tipping trucks

Travel time from the quarry on a good road can be calculated as:

$$20\text{km}/40 \text{ km/h} \times 60 = 30 \text{ minutes.}$$

The return trip with an empty truck travelling from site to the quarry is:

$$20/60 \times 60 = 20 \text{ minutes.}$$

With time for loading and manoeuvring, the total turn-around time is:

$$30+20+7+5+3+10=75 \text{ minutes.}$$

Assuming that the trucks are available for transport during an entire 8 hour workday, each truck is able to deliver $8 \times 60 \text{ min} / 75 = 6.4$ loads per day. As the trucks will not perform a fraction of a delivery, this needs to be rounded off to 6 trips per day, leaving the remaining time for travel to the campsite and vehicle maintenance.

A truck with a capacity of 10 m³, providing 6 loads per day can provide 60 m³ per day. To reach a planned output of 150 m³ per day requires a fleet of 3 trucks.

In comparison, the travel time on a bad road would be $20/10 \times 60 = 120$ minutes with gravel and $20/20 \times 60 = 60$ minutes on an empty return.

The total turn-around time is then $120+60+7+5+3+10 = 205$ minutes; allowing for only 2 trips per day. To reach the daily output of 150 m³ per day would then require a fleet of 8 trucks.

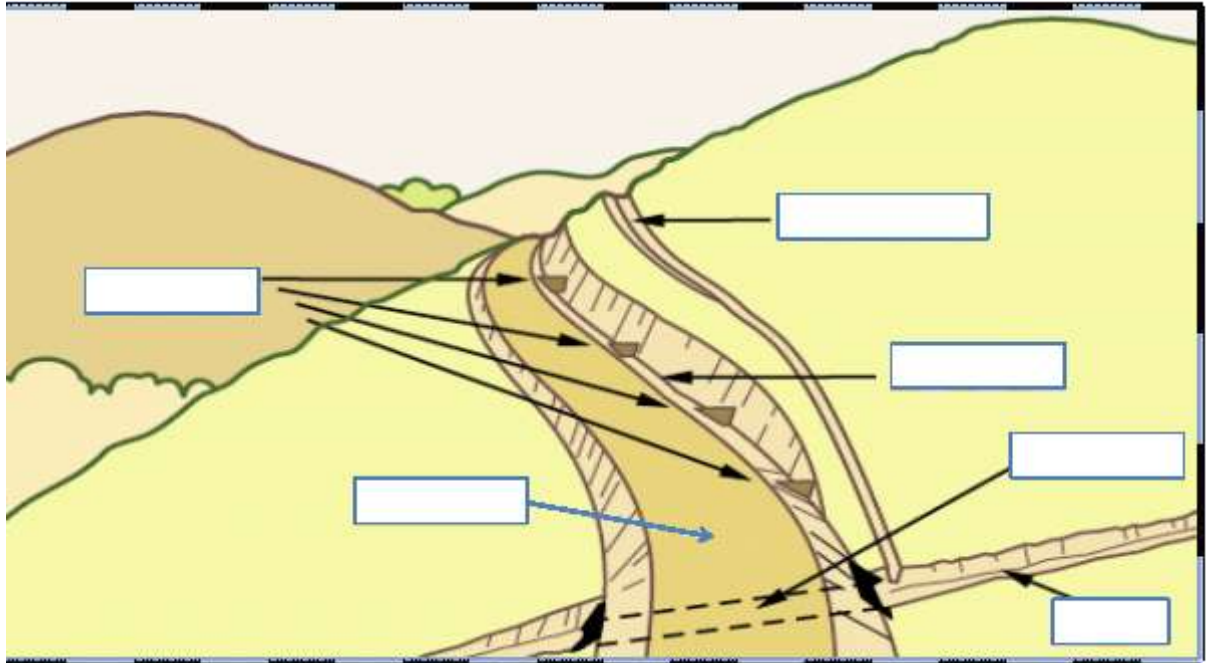
Exercise Code: LBT-12: Gravelling

1. We are planning to complete gravel wearing course of 2 km. Calculate the number of worker days needed for gravel loading and spreading
2. Gravel hauling distance from quarry to the road site is 18 km. The truck capacity is 4m^3 . Calculate the number of trucks needed per day in order to finish the work within 2 months
3. Prepare a work plan based on the calculations above (fill in below)

No	Description of works	Unit	Qty	Task rate	Worker days	Month 1				Month 2				Month 3			
						1	2	3	4	1	2	3	4	1	2	3	4
1	Setting out	m															
2	Excavate and stockpile gravel	m^3		$2\text{m}^3/\text{wd}$													
3	Load and unload gravel	m^3		$3\text{m}^3/\text{wd}$													
4	Spreading of gravel	m^3		$4\text{m}^3/\text{wd}$													
5	Finishing activities																
Total																	

Exercise Code: LBT-15: Drainage

Complete the drawing below by putting the correct drainage term in the boxes

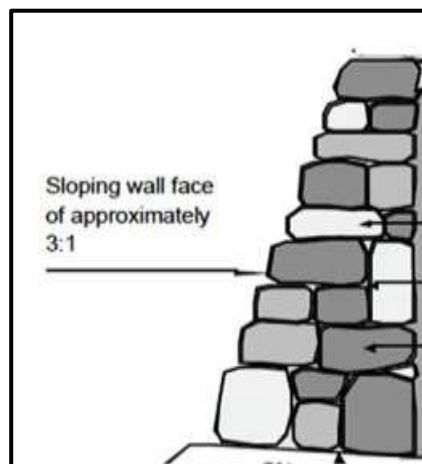


Exercise Code: LBT-16: Stone Masonry

Group exercise to calculate material for concrete and stone masonry

A retaining wall is constructed to protect a slope from erosion and possible land slide. The dimensions of the retaining wall are as per listed below:

Top width	= 0.5m
Height of the wall	= 2m
Length of the wall	= 250m



1. Calculate the material needed to construct the wall as a stone masonry wall, ie the quantities of stone, sand and cement. The mix of mortar should be 1:4 (1 cement: 4 Sand)
2. Calculate the material needed to construct the wall as a concrete wall, ie the quantities of aggregate, sand and cement. The mix of concrete should be 1:2:4 (1 cement:2 sand: 4 aggregate)

Additional exercise: Calculation of reinforcement bars

1. Calculate the weight of steel of dia 6mm, dia 8 mm, dia 10mm, dia 14mm, dia 16mm and dia 18mm
2. A concrete beam is designed to use 4 pieces of steel bar reinforcement of dia 18mm. There is a shortage in the market of steel of dia 18mm. Steel dia 16mm is however available. Calculate the number of steel bars of dia 16mm that would be needed for the same beam design to replace the 18mm.

Exercise Code: LBT-17: Work Plan

Complete work plan below for earth work construction and calculate number of labourers

Rehabilitation of 3 km road for 4 months

No	Description of works	Unit	Qty	Task rate	Work days	No of workers	No of days	Month 1				Month 2				Month 3				Month 4				No Labour					
								1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4						
1	Setting out	M	3,000																										150
2	Clearing	m ²	26,400	80m ² /wd																									135
3	Leveling	m ³	900	2m ³ /wd																									120
4	Side drain excavation	m ³	1,710	1.5m ³ /wd																									105
5	Filling embankm.	m ³	200	1.5m ³ /wd																									90
6	Cambering	m ³	800	1.3m ³ /wd																									75
7	Excavate stockpile gravel	m ³	1,512	1.5m ³ /wd																									60
8	Load and unload gravel	m ³	1,512	3m ³ /wd																									45
9	Spreading of gravel	m ³	1,260	4m ³ /wd																									30
10	Finishing activities	LS	50																										15
Total number of labour																													
Cumulative total number of wd																													

Exercise Code: LBT-17: Work Plan

Prepare monthly site work plan by giving example by the trainer using the following format

Monthly Workplan & Physical Progress

Contract No: _____ Road Name: _____ Km: _____
 District: _____

Total Quantity					Mar	Apr	May	Jun	Percent. complet.
	Unit	Plan	Actual						
Earthworks	km			Plan					
				Actual					
Gravel	km			Plan					
				Actual					
Pipe culvert	no			Plan					
				Actual					
Box culvert	no			Plan					
				Actual					
Cumulative Up to This Month									
	Unit	Plan	Actual						
Earthwork	km			Plan					
				Actual					
Gravel	km			Plan					
				Actual					
Pipe culvert	no			Plan					
				Actual					
Box culvert	no			Plan					
				Actual					

8 Site Administrative Forms

Employment Registration Form

Contract Code			
Road Name			
Name of Worker			
ID Number			
Place and Date of Birth		Age: (>15) __ __	
Home address		District	
		Sub-district	
		Suku	
		Aldeia	
Sex	<input type="checkbox"/> Feto <input type="checkbox"/> Mane	Civil status	<input type="checkbox"/> Kaben Nain <input type="checkbox"/> Divorsiu/Soe malu <input type="checkbox"/> Viuva/u/Faluk <input type="checkbox"/> Klosan/Soltero
Profession	<input type="checkbox"/> La-servisu <input type="checkbox"/> Servisu iha <input type="checkbox"/> Estudante sektor:	<input type="checkbox"/> Hotel/Restaurante <input type="checkbox"/> Fa'an sasan <input type="checkbox"/> Manufaktur <input type="checkbox"/> Agricultura/peska <input type="checkbox"/> NGO <input type="checkbox"/> Transporte <input type="checkbox"/> Fo servisu <input type="checkbox"/> Kostrusaun <input type="checkbox"/> Elektrisidade <input type="checkbox"/> Servisu ba han rasik	
Education	<input type="checkbox"/> La-eskola <input type="checkbox"/> Primaria <input type="checkbox"/> Pre-sekundaria <input type="checkbox"/> Secundario <input type="checkbox"/> Tekniku-preparatoriu <input type="checkbox"/> Ensinu Superior		
Vocational Training	<input type="checkbox"/> Seidauk <input type="checkbox"/> Tuir ona	Area of training	Name of Training Provider
Name Supervisor			
Date of registration	____/____/____	Signature	

Overall/Daily Site Planning and Actual Record

Contract No: _____ Road Name: _____ Km _____ Weather: _____ Sub-District: _____ District: _____

PLANNED						ACTUAL / ACHIEVEMENT						Remark
ACTIVITIES	Unit	Km Start	Km End	Quantity	No Labour	ACTIVITIES	Unit	Km Start	Km End	Quantity	No Labour	
1- Earthworks						1- Earthworks						
Survey & Setting out	m					Survey & Setting out	m					
Bush clearing	m ²					Bush clearing	m ²					
Grass clearing	m ²					Grass clearing	m ²					
Tree cut & stump removal	no					Tree cut & stump removal	no					
Soil excavation / Cut	m ³					Soil excavation / Cut	m ³					
Leveling	m ³					Leveling	m ³					
Ditch - right	m ³					Ditch - right	m ³					
Ditch - left	m ³					Ditch - left	m ³					
Mitre drain	m ³					Mitre drain	m ³					
Benching	m ³					Benching	m ³					
Embankment / Fill	m ³					Embankment / Fill	m ³					
Sloping - right	m ³					Sloping - right	m ³					
Sloping - left	m ³					Sloping - left	m ³					
Forming camber	m ³					Forming camber	m ³					
Turfing	m ²					Turfing	m ²					
Watering / compaction	wd					Watering / compaction	wd					
Supporting	wd					Supporting	wd					
2 - Gravelling Works						2 - Gravelling Works						
Survey & Setting out	m					Survey & Setting out	m					
Clearing	m ²					Clearing	m ²					
Gravel excavation	m ³					Gravel excavation	m ³					
Gravel loading	m ³					Gravel loading	m ³					
Gravel tran. Wheelbarrow	m ³					Gravel tran. Wheelbarrow	m ³					
Gravel spreading	m ³					Gravel spreading	m ³					
Surface improvement	m					Surface improvement	m					
Watering / compaction	wd					Watering / compaction	wd					
Supporting	wd					Supporting	wd					
Total WD						Total WD						
Prepared by:		Date:				Checked by:		Date:				
Site Engineer						ERA Engineer						

Weekly Site Report

Contract No: _____ Road Name: _____ Km _____ Sub-District: _____ District: _____

DATE														CHAINAGE		TOTAL	
ACTIVITY	Unit	qty	wd	qty	wd	qty	wd	qty	wd	qty	wd	qty	wd	Start	End	Quantity	Workdays
1- Earthworks																	
Survey & Setting out	m																
Bush clearing	m ²																
Grass clearing	m ²																
Tree cut & stump removal	no																
Soil excavation / Cut	m ³																
Leveling	m ³																
Ditch - right	m ³																
Ditch - left	m ³																
Mitre drain	m ³																
Benching	m ³																
Embankment / Fill	m ³																
Sloping - right	m ³																
Sloping - left	m ³																
Forming camber	m ³																
Turfing	m ²																
Watering / compaction	wd																
Supporting	wd																
2- Graveling Works																	
Survey & Setting out	m																
Clearing	m ²																
Gravel excavation	m ³																
Gravel loading	m ³																
Gravel tran. Wheelbarrow	m ³																
Gravel spreading	m ³																
Surface improvement	m																
Watering / compaction	wd																
Supporting	wd																
Remarks:									Prepared by:			Checked by:			Total Workdays:		
									Site Engineer			ERA Engineer			Male:		
															Female:		

Monthly Progress Report

Contract No: _____ Sub-District: _____ District: _____

MONTHLY PROGRESS REPORT		SUMMARY PHYSICAL ACHIEVEMENT					
		For the Month of:					
ROAD REHABILITATION	Unit	Road name and length:					
		Cumul. to last month		This month		Cumulative Total	
		Quantity	WD	Quantity	WD	Quantity	WD
1. EARTH WORK							
Survey & Setting out	m						
Bush clearing	m ²						
Grass clearing	m ²						
Tree cut & stump removal	no						
Soil excavation / Cut	m ³						
Leveling	m ³						
Ditch - right	m ³						
Ditch - left	m ³						
Mitre drain	m ³						
Benching	m ³						
Embankment / Fill	m ³						
Sloping - right	m ³						
Sloping - left	m ³						
Forming Camber	m ³						
Turfing	m ²						
Watering / Compaction	wd						
Supporting	wd						
Sub-Total WD							
2. Graveling Works							
Survey & Setting out	m						
Clearing	m ²						
Gravel excavation	m ³						
Gravel loading	m ³						
Gravel tran. Wheelbarrow	m ³						
Gravel spreading	m ³						
Surface improvement	m						
Watering / Compaction	wd						
Supporting	wd						
Sub-Total WD							
3. Structures							
Pipe culvert	no						
Box culvert	no						
Drift	no						
Sub-Total WD							
TOTAL WD							



Prepared by Contractor

Checked by ERA Engineer

Monthly Workplan & Physical Progress

Contract No: _____ Road Name: _____ Km: _____
 District: _____

Total Quantity				2005				Percent. complet.	
Unit	Plan	Actual	Mar	Apr	May	Jun			
Earthworks	km	7	2.5	Plan	1	2	2	2	36
				Actual	0.8	1.7			
Gravel	km	7	1.5	Plan		1	3	3	21
				Actual		1.5			
Pipe culvert	no	5	2	Plan		2	2	1	40
				Actual		2			
Box culvert	no	3	0	Plan		1	2		0
				Actual		0			
Cumulative Up to This Month									
Unit	Plan	Actual							
Earthwork	km	3	2.5	Plan	1	3	5	7	83
				Actual	0.8	2.5			
Gravel	km	1	1.5	Plan		1	4	7	150
				Actual		1.5			
Pipe culvert	no	2	2	Plan		2	4	5	100
				Actual		2			
Box culvert	no	1	0	Plan		1	3		0
				Actual		0			

Remark:	RURAL ROAD REHABILITATION	Date: 08.05.09
Planned: 		Revised Date:
Actual: 		

Prepared by Contractor

Checked by ERA Engineer

Fuel Stock Record

For the Month of: _____ Date: _____

Contract No: _____ Road Name: _____

District: _____

Description	Brought forward	Received this month	Used this month	Lost this month	Brought forward to next month	Remarks
Diesel						
Gasoline						
Engine oil						
Grease						
Hydraulic oil						
Brake oil						

Prepared by Supervisor

Checked by Engineer

Tools Stock Record

For the Month of: _____ Date: _____

Contract No: _____ Road Name: _____

District: _____

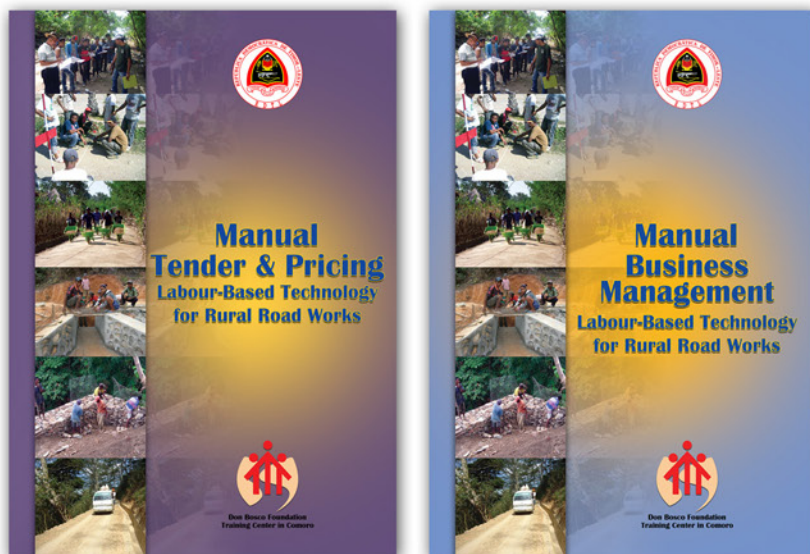
Description	Brought forward	Received this month	Issued this month	Tools broken this month	Tools lost this month	Carried out forward to next month	Remarks
Hoes							
Shovels							
Pickaxes							
Rakes							
Bow saws							
Axes							
Bush knives							
Wheelbarrows							
Stretchers							
Baskets							
Chisels							
File (S)							
File (M)							
Measuring tape 30m							
Measuring tapes 5m							
Ranging rods							
Profile boards							
Line levels							
Hammers 1kg							
Hammers 3kg							
Crowbars							
Crowbars – 80cm							
Crowbars – 150cm							
Rope							
String line							
Sharpening stones							
Gloves							
Spades							
Big saws							
Drums							
Fuel pumps							
Plastic buckets							
Jerry Cans							
Watering cans							
Hand rammers							
Tool handles							

Prepared by Supervisor

Checked by Engineer

9 Power Point Slides

Labour-based rural road work manuals for training provided by Don Bosco Training Center



International
Labour
Organization



NEW ZEALAND
FOREIGN AFFAIRS & TRADE
Aid Programme

Training modules developed through the Enhancing Rural Access Project, with technical support from the ILO and funding from the European Union and the Government of New Zealand