

INVESTIGATION INTO SHORT TERM PLANNING
METHODS IN SOKE SELECTED NIGERIAN
BUILDING SITES

BY

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A thesis submitted to the Postgraduate School,
Ahmadu Bello University, in partial
fulfillment of the requirements
for the degree of

MASTER OF SCIENCE (CONSTRUCTION MANAGEMENT)

Department of Building
Faculty of Environmental Design
AHMADU BELLO UNIVERSITY, ZARIA

October, 1982

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We certify that we have read this thesis and in our opinion it confirms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science Construction Management.

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Dean of Postgraduate School

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Date of Approval/Examination _____ 19 _____

DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree. All quotations are indicated and the sources of informations are specifically acknowledged by means of references.

Owoyale Olapade Sunday

Date: October, 1982

ACKNOWLEDGEMENT

I am grateful to Dr. Balha A. Muazu who through his valuable advices this work could eventually come to an end.

I am also grateful to Ballan A. Hussaini who contributed tremendously in the course of writing this thesis.

Many more than I can mention contributed during the course of writing this thesis and this include Associate Professor Tim. O. Mosaku, Professor Jan Oleszkiewicz, Professor Piwowanski, Mr. A. Okwa, Dr. Sikora, Mrs. Osijuk, Mr. T. Sroka to them I must say thank you.

I am grateful to the contractors whom I visited that gave me free hand in obtaining my data.

My thanks goes to Mrs. J. U. Andah who helped in typing the thesis so also my sincere appreciation to the following people: Obomo Ajayi, Shahu Aliyu, Wariso Gladstone who contributed tremendously.

DEDICATION

This thesis is dedicated to my father Chief Abraham Owoyale who refused compromise but demanded apology.

So also to Madam Abio Mobolaji and Pa Methushella Mabolaji to whom I am indebted.

ABSTRACT

Not much research had been done on short term planning techniques in general. They appear vaguely in text books and journals.

A review of the literature was made after which an investigation into the existing technique on the Nigerian building sites was carried out.

To do this, questionnaire was prepared and this was aimed at finding the existing methods, the effectiveness of the methods and the means of communicating these methods to the workers.

On obtaining these informations, a proposed written model was made putting into consideration all the possible local constraints.

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CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND

Short term planning refers to the planning aspect of a project when a small part of the overall plan is covered in greater detail. The unit of the Master plan usually being months, whereas short term planning will have units of weeks, days and even hours.

Short term plan are prepared following or proceeding as the case may be, regular meetings at which all the personnel concerned in executing the building project meet for discussion.

The meeting discusses the previous short term plan, noting whenever a gain or slippage has occurred. Then either out line the basis of the next short term plan for the planning engineer to put on paper or to discuss the next programme that has been drawn up in advance by the planning Engineer.

The short term plan is the forward looking view, when one can study in greater detail operations that have been considered in the overall master plan. The length of a short term plan is very relative, but in some cases it is usually from three to five weeks. Based on this, weekly plans are then formulated.

To update the Master plan on every occasion that something goes wrong may be a very difficult undertaking. With short term plan, slippages and alterations can be highlighted and reference can be made on the Master plan to the relative short term plan. When the Master plan is then updated all points will have been recorded.

By means of short term planning, the recovery of lost time can be indicated, the steps may be involving extra cost and plant utility can be shown.

Alternatively for a project that is running ahead of schedule, steps should be taken to bring forward deliveries of materials and if the advance is being obtained by uneconomic means i.e. excessive overtime, then steps can be shown on the short term plan to smooth this down and then proceed in line with the Master plan.

When considering the summary of operations, WHAT, WHERE, WHY, HOW and WHEN attitude are adopted to all of the operations, and from the answer that materialises one may consider it right to alter the sequence of some operations, speed up completion of others, reconsider the type of material to be used etc.

Material and plant requirements are also shown on the short term plans and steps should be taken to see that the necessary orders are placed and requisition issued.

Moreover, advice are given to the subcontractors of their commencement dates and where they come in in the plans.

1.2. SHORT TERM PLANNING OF BUILDING WORKS

When a project has been approved, it is assumed the contractor is capable of carrying out the intended work as scheduled taking time and cost into consideration.

To do this, top management formulates the overall programme of the work. This programme indicate the date of completion of the work. The duration, material need, plant and labour requirement of each operation.

The formulated programme may take different forms of presentation, but the usual form is the bar - chart. This programme is then referred to the site for the practical application by the site men.

Details of operation from the overall plan are made by the site management team to plan for the works ahead. This process of extraction and detailing from the overall plan as indicated earlier is referred to as short term planning.

It is not usually possible to rely on memory for all the works to be done 'on site next week' or even the next day. Therefore short term plan would be of help to the

site agent since this will clearly show the operation to be done and its duration. With a detailed short term plan, the requirement for the daily operations on site are well anticipated ahead of time.

In Nigerian building sites, the majority of the foremen are barely literate and it is always very difficult for the planner to explain in detail his plan. The proper application of short term planning on the site has been received with less efficiency.

Hence time and cost of construction could easily be controlled if short term planning is in general use in Nigerian sites. This is possible because operations would be planned and controlled more effectively.

1.3. NEED FOR THE RESEARCH

In general, when a building contract is awarded, it is expected that the work would be within the limits of the time and cost stipulated in the contract.

In Nigeria, most projects usually cost more than the initial contract sum and the duration of the contract is usually longer than that scheduled. The main causes of this deficiency could be attributed to the lack of proper planning both at the head office and on the site among other things.

Efficiency of site operations could be improved by having a detailed short term plans on the site. Time scheduling methods (e.g. CPM/PERT)¹ are mainly of interest to senior managers and are of little help to the men on site. These planning techniques provide no. assistance in defining the means of accomplishing the assigned tasks, but only an overall schedule.

Generally, construction industry is basically craft based and not much research is carried out to increase it's efficiency. The works of carpenters, painters, iron benders, tilers among others are usually carried out now just like it was in the past. Hence there is a need for research in the planning of construction work.

Moreso, there is a need for which the productives are fully aware of the task to be carried out. Hence communication of short term plan between the planner and the foremen is very important for good quality of output.

1.4. BASIC ASSUMPTIONS

The basic assumption for this thesis is that there exists Master overall plan for the total operations to be carried out on the site.

¹ Critical Path Method/Programm Evaluation and Review Technique.

It is fairly legitimate to make this assumption because when a construction contract is won, the successful tenderer is usually asked to produce a schedule of his overall work. The formulation of short term plan from the overall plan is then possible by extraction, as explained earlier.

1.5. OBJECTIVES OF THE RESEARCH

In Nigeria, most of the awarded building contracts take longer time and usually cost more than estimated.

These two factors could be greatly avoided if there is effective short term planning on the site, and the plan is communicated to the foremen. The foremen in turn give directives to the crews for carrying out the assigned tasks.

With the failure of most Nigerian building sites meeting the target of cost and time, it becomes of interest to investigate into the nature of existing short term planning on some selected sites (if they have any). The ways this plan are extracted from the overall plan and the means in which the plans are communicated to the crew.

These objectives and the proposed ways of achieving them are summarised below:-

1. A review of short term planning techniques used in shorter term planning.

2. An investigation into the short term planning techniques used locally.
3. To finally propose a short term planning model to compose of the graphic model modified with local constraints that are identified from investigation of short term technique of Nigerian building sites.
4. To use the proposed short term planning model showing how to solve the particular problems of short term planning in Nigeria.

1.6. SCOPE OF THE RESEARCH

The scope of this research is for contracts not exceeding five years duration when the investigation was carried out.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. PLANNING CONSTRUCTION WORK

According to ~~Coley~~ and Poskitt (20) planning in construction is usually broken down into pre-tender, pre-contracts and short term planning.

Planning at the pre-tender stage is in outline form. Such planning considers only the phasing of the main operations since much information is not at that stage available.

Pre-contract planning includes the planning for the overall programme, labour schedule, plant schedule, material schedules etc.

Short term planning on site is done in greater detail and the programmes at this stage are broken down much further. It is this aspect of construction planning that is important to us in this work.

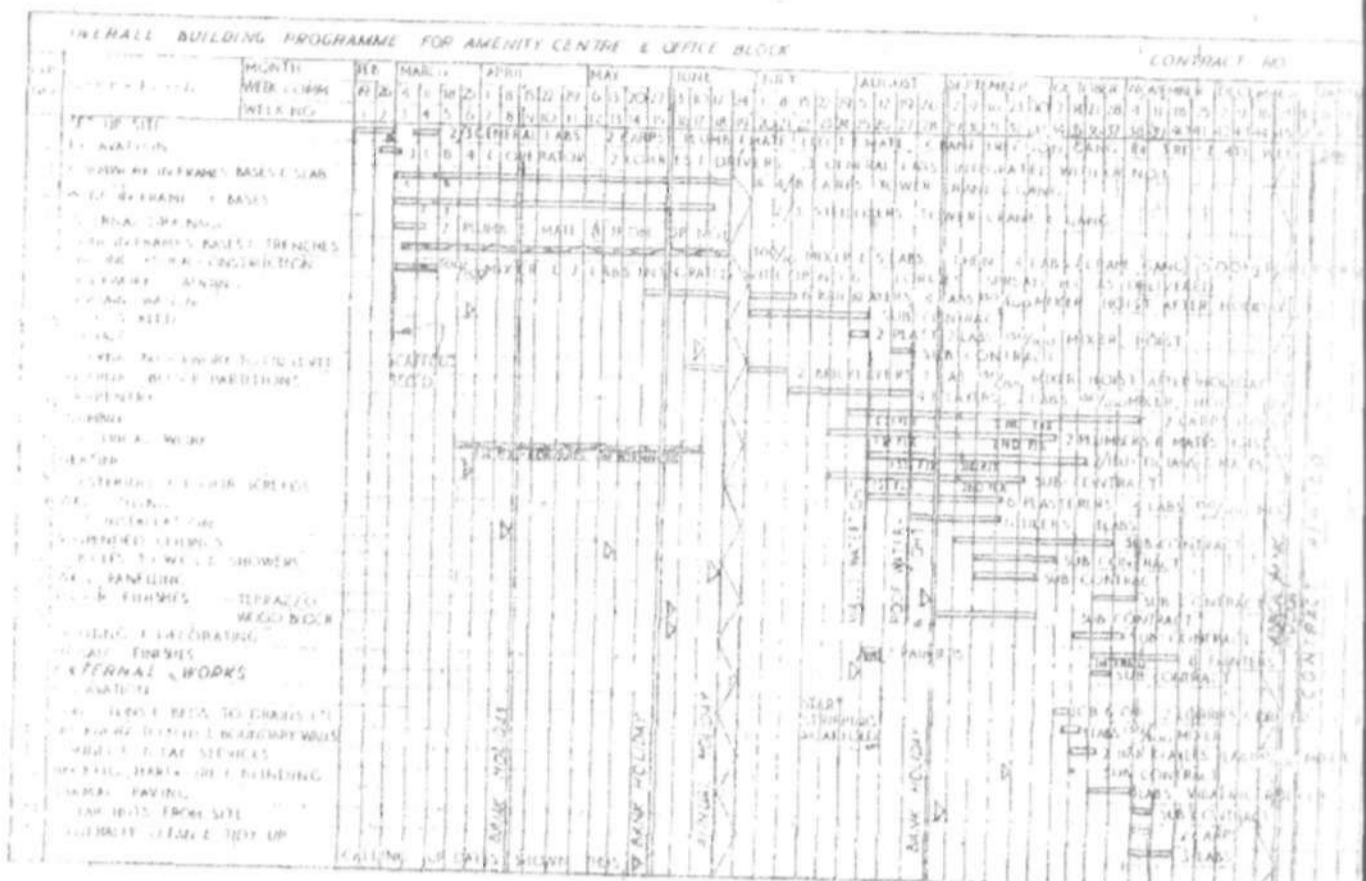
2.2. MASTER OVERALL PLANNING

The master overall plan shows the sequence in which the total works will be carried out. It shows the total project duration, and the duration for each operation.

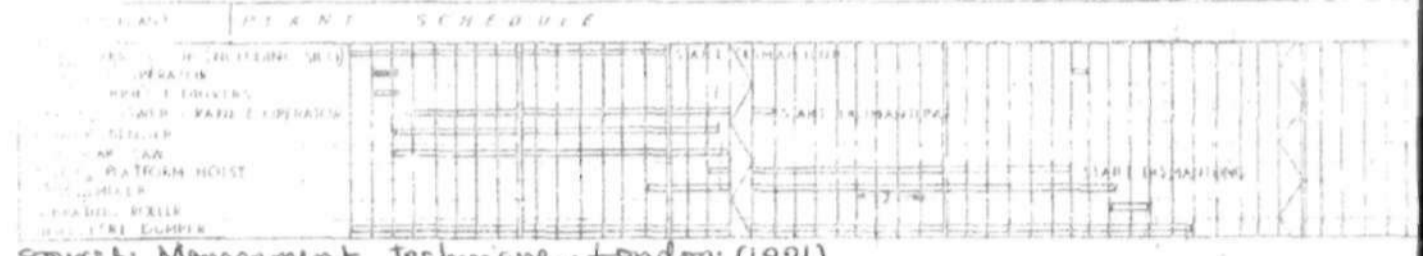
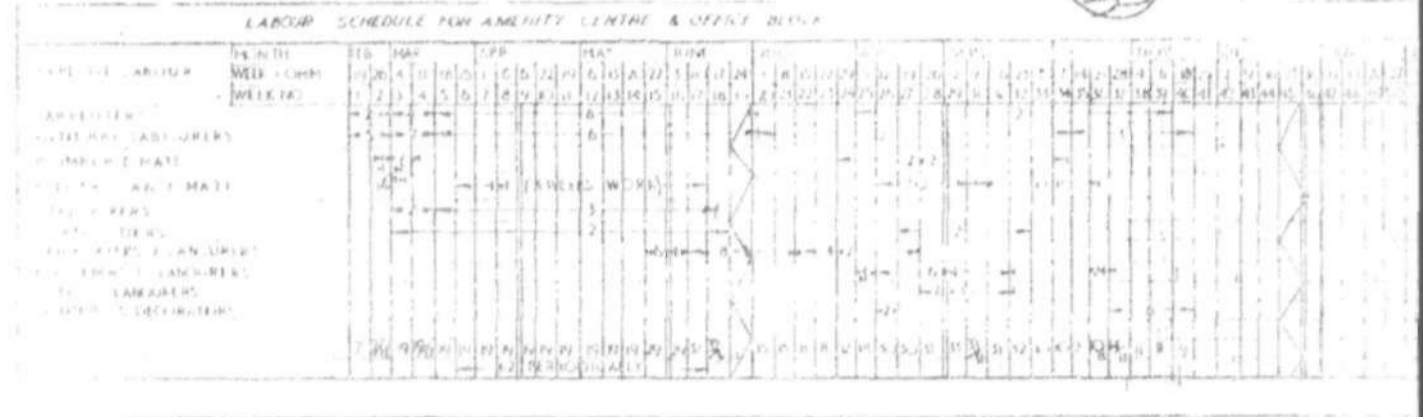
Labour and plant schedules are sometimes indicated to

An illustration of master overall plan

2A



2B



Source: Management technique, London (1991)

enable the planner of short term plan on the site to know the anticipated labour force and plant requirement for the operations.

Figure 2.1. shows an example of overall programme for an Amenity Centre and office block. The project duration was forty weeks, that is the work was expected to start on the 19th February and finished on the 18th November.

An operation such as set up site (operation number 1) is expected to be completed within the first and the fourth week after commencement. Five general labourers, 2 carpenters, 1 + 2 plumber and mate: that is one plumber, two mates, 1 + 1 electrician and mate; that is one electrician and one mate, and the sub contract work of crane exector are the total labours and plant required for this particular operation.

Other operations such as "concrete in frames bases and trenches" starts in the mid-week number 3 and it continues to ~~week~~ number 18, requiring 300/200 mixer and 3 labourers, then 4 labourers working on crane 500 kg. (Tower crane).

In Fig. 2.1., though information about the labour and plant were given on the chart, this information could similarly be obtained on the labour and plant scheduled attached below.

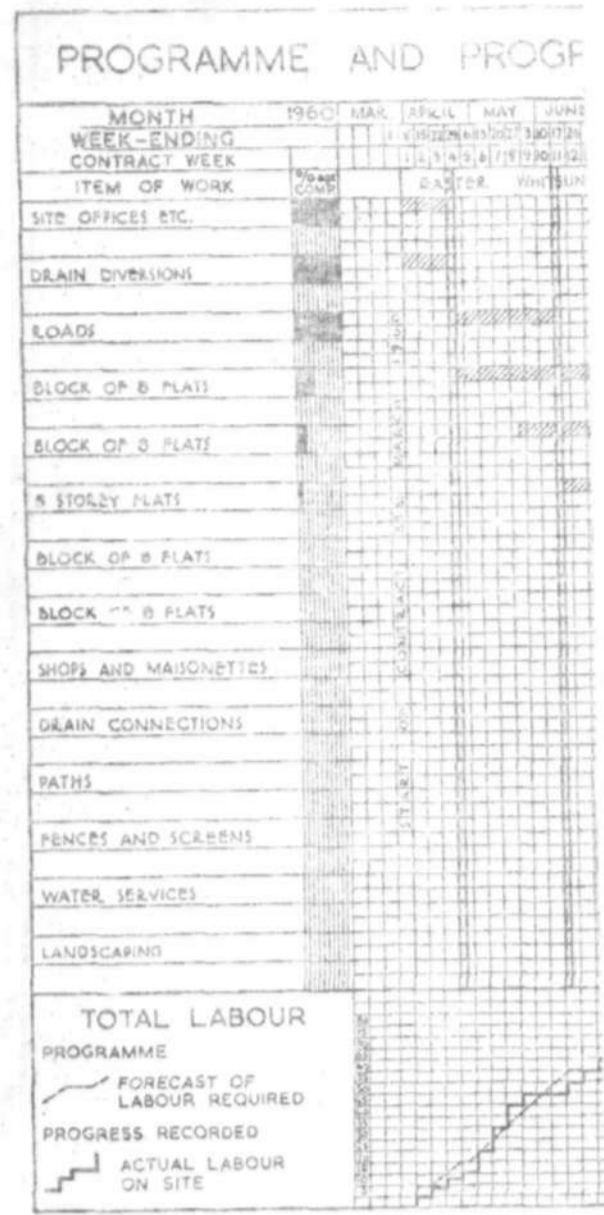


Fig 2.1.1

Source: Introduction to B

For instance 'set up site' (operation one) requires five general labourers, as could be seen on the General labourers rows with thick headed arrow, two carpenters, one plumber and two mates, one electrician and one mate.

Allowances are made for the holidays that comes up during the construction process.

Calvert (5) gave the overall programme for the construction of housing estate. The contract period was from 31st March, 1960 to 31st December, 1961.

The various operations to be carried out are outlined in bar chart as shown in fig. 2.1.1. For example "site offices etc" was scheduled to take place on the first three weeks on the contract and the percentage completion was shaded on the ten sub division of the percentage column.

2.3. SHORT TERM PLANNING

Oxley and Foskitt (20) gave the duration of short term planning to cover between four to six weeks or that it may cover a stage of the work. If the planning is done every six weeks, new programmes can be drawn up every fourth week thus giving a two weeks overlap for any review.

CONTRACT: AMENITY CENTRE & OFFICE BLOCK		SIX WEEKLY PROGRAMME		PERIOD - FEB 1971 TO MAR 1971											
NO	OPERATION	UNIT PRICE / M.HRS	LABOUR / OR PLANT	FEBRUARY						MARCH					
				1	2	3	4	5	6	1	2	3	4	5	6
SET UP SITE															
1	ERECT HOARDING	25	2 CARPS												
2	TOWER CRANE BASE	15	2 LABS												
3	SET UP MIXER & ALL HD	40	3 LABS												
4	SITE ACCOMMODATION	10	2 CARPS												
5	EXCAVATE FOR ALL SERVICES	50	3 LABS												
6	WATER SERVICE & WC	20	PLUMBS												
7	ELECTRIC SERVICE	15	ELC. MTR												
8	ERECT TOWER CRANE	ERECT CRANE	7												
FOUNDATIONS															
9	REDUCE LEVEL DIG	7	ICE/CR												
10	DIG TRENCHES & BASES	28	3 LABS												
11	REIN IN FOUNDS ETC	58	25 STYCS												
12	HC PAIR BASES & SUB	96	4 CARPS												
13	INTERNAL DRAINAGE	96	4 PLUMBS												
14	CONC IN BASES & TRENCH	22	MOB/71												
15	HC PAIR & BLINDING	62	7 LABS												
16	D.P.H. & G.F. CONC.	17	MOB/71												
COXS TO U/S. 17 BEAMS															
17	REIN	78	25 STYCS												
18	FORMWORK	240	10 CARPS												
19	CONCRETE	18	MOB/71												
1ST FLOOR IN CANOPY															
20	FORMWORK	584	10 CARPS												
21	REIN	252	15 STYCS												
22	CONCRETE	11	MOB/71												
23	CONCRETE (IN F. SLAB)	27	MOB/71												
24	SCAFFOLDING														
REMARKS		LABOUR REQUIREMENTS													
		CARPS													
		GENERAL LABS													
		PLUMBS & MTR													
		ELECT. & MTR													
		STEEL FIXERS													
		CR. DR. & GANG													
		SCAFFOLDERS													
REMARKS		PLANT REQUIREMENTS													
		100/100 MIXER													
		ICE & COPPER													
		4m ² LOAR & CR													
		500kg TOWER CR. CR													
		POWER GENER													
		CIRCULAR SAW													
		400 litre DUMPER													

Source: Management Technique - London - 1971
Fig 2.2

This weekly planning can then be used as a basis for operational instructions for communicating the plan to the trades foremen, gangers and operatives and to help in coordinating the requirement of different sites.

An illustration of the short term is given in figure 2.2. The period covered in the first six weeks of the contract and the procedure for the planning is as given below:

- (i) Break down the operation in the overall plan into more detailed operations as shown in the six weekly programme (Fig. 2.2.), taking care to include all operations. Any preparatory work necessary should be included.
- (ii) Fill in plant-hours and/or productive man-hours for the detailed operations.
- (iii) Decide on the number of operatives and plant necessary and calculate the time required, plotting each operation on the programme as it is considered.
- (iv) The labour requirements can then be obtained from the six weekly programme by adding up the labour required each day.
- (v) The plant requirements can also be obtained from the six weekly programme.

CONTRACT:

WEEK No. 5

CONTRACT No:

WEEKLY PLANNING

WEEK COMM. MARCH, 18

OP. NO.	OPERATION	LABOUR & PLANT	DAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
			DATE	18th	19th	20th	21st	22nd	23rd	24th
1	Erect. Reinf. to cols	3 steel fixers								
2	Erect Framework to cols	8 Carps								
3	Pour concrete to cols	4 Labs 300/200 mixer								
4	Strip fwk. to cols	8 carps								
5	Prepare Reinf. to Beams & Floor	3 steel fixers								
6	Erect Formwork to Beams & Floor slab	8 carps								
7	Fix Reinforcement to Beam & Floor	3 Steel Fixers								
8	Erect Scaffolding	2 Scaffolder								
LABOUR										
Carpenters	Planned		8	8	8	8	8			
	Actual									
Steel Fixers	Planned		3	3	3	3	3			
	Actual									
Labourers	Planned		4	4	4	4	4			
	Actual									
Scaffolders	Planned		2	2	2	2	2			
	Actual									

Source: Management technique London 1974

Fig 2.3

A further breakdown of the six weekly planning into weekly planning is as shown in figure 2.3. Here all the operations to be carried out during the next week are listed in their order of starting time.

In figure 2.3. operations such as "Erect reinforcement to column" is scheduled for Monday 18th and three steel fixers are expected to carry out this operation. An operation such as "pour concrete to column" is scheduled for Monday 18th and Tuesday 19th requiring four labourers and 300/200 mixer for the operation.

Moreover, the labour requirements are entered below the weekly planning and this will assist in coordinating the requirements of different sites. Plant and other requirement should now be finally checked to ensure that they will be available when required.

Hollins (14) described short term planning as a periodic consideration of the progress to date for each and every operation in the master overall plan.

It embraces a forward view of the work to be carried out for a short period ahead. The purpose is to keep the master plan alive for the case of unforeseen circumstances.

Hollins gave five weekly planning for the works ahead, this is shown in fig. 2.4. In this figure, the quantities

FIVE WEEKLY PROGRAMME OF WORK

CONTRACT J. B. DOBSON LIMITED

CONTRACT NO 1377

PERIODICAL FROM APRIL 21ST

QUANTITIES		OUTPUT	LABOUR				PLANT			OPERATIONS		APRIL						
QTY	UNIT	STANDARD	TOTAL	GAZE	GAZE	GAZE	TYPE	HOURS	DAYS	NO		1	2	3	4	5	6	
			REQS	SIZE	NO	NO	NO					MIN	T	S	W	T	F	S
80	m ³	2.88	230	6L		5D				1	ERECT STATION BASES							
80	m ³	0.35	28	4L	70%		CONCRETE			2	BLINDING STATION BASES							
116	kg	0.04	46	25%		3D				3	REINFORCEMENT STEEL BARS							
584ms		2.00	80	2C		3D				4	REINFORCEMENT STEEL BARS							
33	m ³	4.1	135	3L		3D				5	CONCRETE STAIN BARS							
244	kg	0.04	125	25%		3D				6	REINFORCEMENT COLUMNS							
20.8	m ³	2.15	45	2C		3D				7	REINFORCEMENT COLUMNS (C. 12)							
1.81	m ³	4.43	15	4L	40%					8	EXC.							
12	m ³	2.525	125	4L		75D	245ms			9	STEEL GIRDERS BEAMS							
										10	HARDWARE							
78	m ²	0.36	28	4L	70%					11	BLINDING GROUND BEAMS							
68	m ²	1.23	84	4C		5D	168ms			12	FRAMING GROUND BEAMS							
300	kg	2.1	20	10%		25D				13	REINFORCEMENT CH. BEAMS							
22	m ³	4.15	93	3L		25D				14	CONCRETE GROUND BEAMS							
67	m ²	1.30	30	2L		54D				15	HARDWARE							
230	m ²	0.42	232	6L	37%	54D				16	SCAFFOLDING							
170	m ²	2.40	645	15		208D				17	ERECTOR G.F. 18' 10"							
304	m ²	0.30	91	25C		54D				18	SCAFFOLDING FOR BRICK							
97	m ²	1.42	137	4C		5D				19	FRAMING C.C. G.F. 18' 10"							
8.83	m ³	8.47	75	4L		25D				20	CONCRETE C.C. G.F. 18' 10"							
230	m ²	0.30	66	25C		4D				21	SCAFFOLDING							
136	m ²	3.25	437	4C		134D				22	FRAMING G.F. BEAMS							
335	m ²	0.54	160	4C		6D				23	FRAMING SCHEDULED G.F. BE.							

BRIEF SCHEDULE OF REQUIREMENTS

NO	DESCRIPTION	STATUS	DATE
A	STEEL REINFORCEMENT	ORDERED	✓
B	FRAMING COLUMN SHEET	ACC NO 001	✓
C	FRAMING G.F.	ORDERED	✓
D	SCAFFOLDING	ORDERED	✓
E	ERECTOR COLUMNS	ORDERED	✓

Source: Production & Planning applied to Building, Norwich, 1977, Fig 2.4

of the operations are indicated as well as the output standard expected to carryout the operation. The labour and plant required are also indicated.

Taking as an example "Excavation, stanchion bases", the quantity of this work is 80 m^3 , the output standard is 2.925, the total hours for the excavation is 234 hours and the gang size is 6 labourers working for five days.

Furthermore, operation such as "Formwork Columns (G.P.L)" requires 20.8 m^2 quantity of timber, the standard output is 2.15, the total hour for this operation is 45 hours and 2 carpenters are needed for 3 days ($\frac{1}{2}$ day on Saturday, Monday, Tuesday and $\frac{1}{2}$ day on Wednesday).

With full description of the operations, the main contractor or the subcontractor will be in a position to predict the status of operations ahead.

Weekly planning was finally recommended by Hollins to keep the short term planning alive. An example is shown in figure 2.5, which is extracted from the overall master plan.

The operations to be performed during the week are shown with the arrow and their various durations. For example, 1st fixers was the work undertaken by the prime contractor.

WEEKLY SITE PLAN											
CONTRACT	CONTRACT NO. 1374				WEEK No. 2			WEEK COMMENCING 3:6:70			
GANG	BUILDERS WORK	SUB CONTRACT	TRADE	PLANT	MON	TUE	WED	THURS	FRID	SAT	SUN
1st FIXERS	6	-	Card	Hand Tools	Stud Partitions (Room 2)			Grounds			
PLASTERERS No. 1	2	-	Plasterers	-	M.C.	Render RM4		Setting (Room 4)			
PLASTERER No. 2	-	4	Plasters	-	Ceilings (Rooms)		Ceilings (Room 2)				
SPARKS	-	2	Elect.	Hand Tools	First Fixing			First Floor			
PLUMBING	4	-	Plumbers	Hand Tools	H. C. Runs First Fl.			Waste and C.I. works G.P.			
NAVVIES	4	-	Las		Cleaning up						
CONCRETE TEAM	5	-	Las	Road	South Side 6 Bays			Casing Drain Runs - 6			
TOTAL LABOUR	21	6	Staff Supervision		Agent	O.S	Engr	G.F.	Foremen	Storeman	Clerk
			6		1	1	1	1	2	-	-

Source: Production & Planning applied to Building - Norwich (1971) Fig 2.5

The trade needed are the carpenters using hand tools for stud partitions in room 2 and is expected to start on Monday and finished on Wednesday of the same week. Plasterers No. 2 was an aspect of the work given out to subcontractors involving four plasterers for ceilings of room 6 and room 7.

The total labour required for the week are twenty one and six for prime contractor and subcontractors respectively. The total number of supervising staff for the week was six and this include the Agent, Quantity Surveyor, Engineer, General foreman and foremen.

Hollins further recommended the Agent to formulate short term plan and contract supervisor or manager from the head office should be in attendance to advice him. A representative from the firm of subcontractors should also be in attendance.

The resources to be used are well anticipated well ahead of time. Figure 2.6 shows the subcontractors requirement schedule. For instance, the need for steel reinforcement could be obtained by subcontractor or supplier of reinforcement limited.

The period required before commencement was three to four weeks. The planned commencing date was given and the

SUB-CONTRACTORS REQUIREMENT SCHEDULE						
CONTRACT		CONTRACT No.		DATE		
No	DESCRIPTION	SUB CONTRACTOR OR SUPPLIER	PERIOD REQUIRED BEFORE COMM'NT AFTER ORDER	PLANNED COMMENCEMENT DATE	DATE WHEN ORDER MUST BE PLACED	DEADLINE DATE FOR ARCHITECTS INSTRUCTION
1.	217 PL ARCHITECTURE	WILSON & CO LTD	1 - 4 WEEKS	19.12.70	19.12.70	19.12.70
2.	PAINT GLAZING WOODEN JOIST SYSTEMS		2 WEEKS	20.12.70	AT ONCE	AT ONCE
3.	WALL AND WALL GLAZING		4 WEEKS	27.12.70	AT ONCE	AT ONCE
4.	ROOF JOISTS		7 WEEKS	20.01.71	20.01.71	20.01.71
5.	ROOF PLANKS	WILSON & CO LTD	10 WEEKS	20.01.71	20.01.71	20.01.71
6.	ROOFING		8 - 10 WEEKS	20.01.71	20.01.71	20.01.71
7.	WALLS		1 WEEK	20.01.71	20.01.71	20.01.71
8.	WALLS		2 WEEKS	20.01.71	20.01.71	20.01.71
9.	WALLS		3 - 4 WEEKS	20.01.71	20.01.71	20.01.71
10.	WALLS		4 - 6 WEEKS	20.01.71	20.01.71	20.01.71
11.	WALLS		7 - 10 WEEKS	20.01.71	20.01.71	20.01.71
12.	WALLS		11 - 12 WEEKS	20.01.71	20.01.71	20.01.71
13.	WALLS		13 - 14 WEEKS	20.01.71	20.01.71	20.01.71
14.	WALLS		15 - 16 WEEKS	20.01.71	20.01.71	20.01.71
15.	WALLS		17 - 18 WEEKS	20.01.71	20.01.71	20.01.71
16.	WALLS		19 - 20 WEEKS	20.01.71	20.01.71	20.01.71
17.	WALLS		21 - 22 WEEKS	20.01.71	20.01.71	20.01.71
18.	WALLS		23 - 24 WEEKS	20.01.71	20.01.71	20.01.71
19.	WALLS		25 - 26 WEEKS	20.01.71	20.01.71	20.01.71
20.	WALLS		27 - 28 WEEKS	20.01.71	20.01.71	20.01.71
21.	WALLS		29 - 30 WEEKS	20.01.71	20.01.71	20.01.71
22.	WALLS		31 - 32 WEEKS	20.01.71	20.01.71	20.01.71
23.	WALLS		33 - 34 WEEKS	20.01.71	20.01.71	20.01.71
24.	WALLS		35 - 36 WEEKS	20.01.71	20.01.71	20.01.71
25.	WALLS		37 - 38 WEEKS	20.01.71	20.01.71	20.01.71
26.	WALLS		39 - 40 WEEKS	20.01.71	20.01.71	20.01.71
27.	WALLS		41 - 42 WEEKS	20.01.71	20.01.71	20.01.71
28.	WALLS		43 - 44 WEEKS	20.01.71	20.01.71	20.01.71
29.	WALLS		45 - 46 WEEKS	20.01.71	20.01.71	20.01.71
30.	WALLS		47 - 48 WEEKS	20.01.71	20.01.71	20.01.71
31.	WALLS		49 - 50 WEEKS	20.01.71	20.01.71	20.01.71
32.	WALLS		51 - 52 WEEKS	20.01.71	20.01.71	20.01.71
33.	WALLS		53 - 54 WEEKS	20.01.71	20.01.71	20.01.71
34.	WALLS		55 - 56 WEEKS	20.01.71	20.01.71	20.01.71
35.	WALLS		57 - 58 WEEKS	20.01.71	20.01.71	20.01.71
36.	WALLS		59 - 60 WEEKS	20.01.71	20.01.71	20.01.71
37.	WALLS		61 - 62 WEEKS	20.01.71	20.01.71	20.01.71
38.	WALLS		63 - 64 WEEKS	20.01.71	20.01.71	20.01.71
39.	WALLS		65 - 66 WEEKS	20.01.71	20.01.71	20.01.71
40.	WALLS		67 - 68 WEEKS	20.01.71	20.01.71	20.01.71
41.	WALLS		69 - 70 WEEKS	20.01.71	20.01.71	20.01.71
42.	WALLS		71 - 72 WEEKS	20.01.71	20.01.71	20.01.71
43.	WALLS		73 - 74 WEEKS	20.01.71	20.01.71	20.01.71
44.	WALLS		75 - 76 WEEKS	20.01.71	20.01.71	20.01.71
45.	WALLS		77 - 78 WEEKS	20.01.71	20.01.71	20.01.71
46.	WALLS		79 - 80 WEEKS	20.01.71	20.01.71	20.01.71
47.	WALLS		81 - 82 WEEKS	20.01.71	20.01.71	20.01.71
48.	WALLS		83 - 84 WEEKS	20.01.71	20.01.71	20.01.71
49.	WALLS		85 - 86 WEEKS	20.01.71	20.01.71	20.01.71
50.	WALLS		87 - 88 WEEKS	20.01.71	20.01.71	20.01.71
51.	WALLS		89 - 90 WEEKS	20.01.71	20.01.71	20.01.71
52.	WALLS		91 - 92 WEEKS	20.01.71	20.01.71	20.01.71
53.	WALLS		93 - 94 WEEKS	20.01.71	20.01.71	20.01.71
54.	WALLS		95 - 96 WEEKS	20.01.71	20.01.71	20.01.71
55.	WALLS		97 - 98 WEEKS	20.01.71	20.01.71	20.01.71
56.	WALLS		99 - 100 WEEKS	20.01.71	20.01.71	20.01.71

Source: Production and Planning applied to Building - Norwich (1971)
 Fig 2.6

date when order should be placed was also given, in this case it should be by hand. Moreover the deadline for the architects instruction was also outlined.

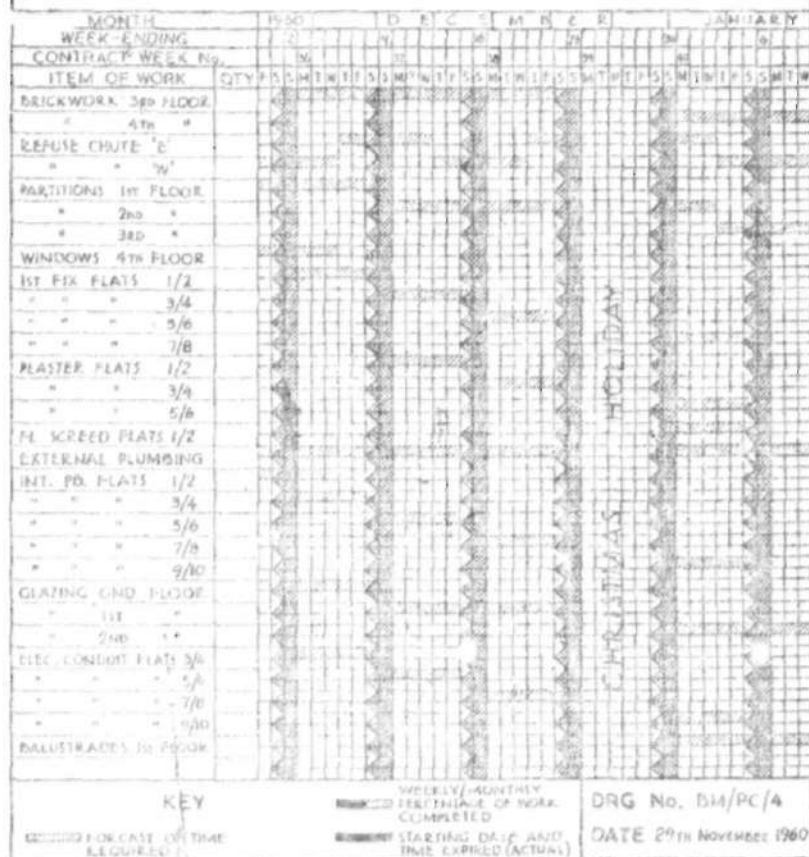
Figure 2.4 shows the requirement schedule of drawings and details. Here the description of all information required were tabulated and the various deadline dates were also given. As an illustrative example, "Detail of precast Gill and Copings". The deadline date was seventh September nineteen seventy.

Calvert (5) explained short term planning as follows:

"To be wholly effective, planning must be a continuous activity, an attitude of mind rather than a once-for-all operation. Hence the preparatory groundwork of contract preliminary or project planning must be extended by regular short term planning and programming on the site. The purposes of this systematic and analytical pattern of thinking include the following objectives:

- a) To encourage the site management to look ahead, to foresee immediate requirements and hence avoid delays.
- b) To review the actual progress achieved, to check performances, and either to take corrective action for shortcomings or to take advantage of any gains.
- c) To incorporate any design modifications; or to facilitate improved production techniques in the light of fuller information or further investigation, e.g. work study.

CONTRACT: 5 STOREY BLOCK STAGE Weeks 36/40



Source: Introduction to Building Management London (1976)
fig 2.8

By forecasting for a shorter period of time it is possible to plan in greater detail and with more accuracy so that the way is also prepared for practical incentive schemes. Master and section programmes are further enlarged, the degree of magnification depending upon the nature of the work, the number and quality of the staff available, and the company's stage of development in these techniques. Although several combinations are possible, the two following alternatives are typical.

Monthly Programming

During the last week of each calendar month, a programme is prepared by the site agent/general foreman for the next four or five weeks ahead. Alternatively the period may be varied to coincide with particular stages of the work, e.g. foundations, frame, cladding, finishes, etc., and for this reason it is sometimes more usual to refer to this as a stage programme (see fig.2.6). The layout of the chart is as before but it shows weeks and days, with week-end rest periods. Relevant operations are transferred from the existing programmes, together with any work outstanding from the previous period and any additions or items brought forward for any reason. Headings may be further broken down such as brickwork into lifts, and additional minor items can be included. Drafting the stage programme is a technique similar to that described for section programmes, but it requires even greater attention to the avoidance of double-handling and the maintenance of continuity of work for both labour and plant.

Every operation must then be systematically checked to ensure that the essential information, material, plant and labour is or will be available, and the proper corrections made where necessary. Any sub-contractors not yet on site must be advised of firm starting dates, and any possible bottlenecks or hindrances should be thoroughly investigated and obviated.

Weekly planning meetings are then held, perhaps on a Friday, to review the current progress against planned production and to consider

the next week's commitments under the stage programme. All trades foremen and sub-contractors should be present, so that inter-relations can be discussed and overlapping demands for equipment, etc., can be settled. As a result of these meetings work lists (see fig. 2.9) are prepared for each gang, detailing every task for the coming week. Thus the ganger or chargehand can organise preparatory work ahead and proceed from job to job without delay or waiting for fresh directions. Extra items can of course be added as they arise, and the list can easily be extended to serve either as an allocation sheet for cost purposes or as the basis for a bonus scheme. Completed work is ticked off, and the reasons noted for any tasks not performed so that the appropriate action can be taken.

Weekly Programming

Where applicable, a finer control of production may be achieved by preparing weekly programmes. It is however still necessary to take a forward view each month, by listing from the section programmes the operations to be attempted during the coming month, and checking the requirements exactly as before (see fig. 2.10).

WEEKLY WORK LIST

GANG : Jones Bricklayer. No. of 4 + 2 W/E 10th
TRADE : Men March, 1960

Location	Description of Work	Tick when Done	Foreman's Remarks
F/	Manholes Nos. 3, 4 & 5		
Retg. Wall	Complete both wing		
Canteen	Footings up to D.P.C.		Front delayed strip footings
Gate House	Build weigh-bridge pit		
Office Blk.	1st floor cladding		
"	1st floor partition		

Fig. 2.9.

REQUIREMENTS SCHEDULE OF DRAWINGS & DETAILS

CONTRACT: J. S. DOBSON LTD.

CONTRACT NO. 1374

DATE: 30.7.70

REF.	DESCRIPTION OF INFORMATION REQUIRED	DEADLINE DATE	REMARKS
1.	POSITION OF TEMPORARY SCREEN	14.9.70	
2.	DETAILS OF REINFORCEMENT TO STRIP FOUNDATIONS	14.9.70	
3.	DETAILS OF CONCRETE STEPS	21.9.70	
4.	DETAILS OF PRECAST CILL AND COPINGS	7.9.70	
5.	DETAILS OF RAGBOLTS IN CONCRETE BEAM	21.9.70	
6.	DETAILS OF JOINERY	21.9.70	
7.	DETAILS OF FLOOR CHANNEL	14.9.70	
8.	DETAILS OF LAVATORY BLOCK	7.8.70	
9.	DETAILS OF COMBINED LINTOL AND CAVITY TRAY	21.9.70	
10.	DETAILS OF DOME LIGHTS	27.10.70	
11.	DETAILS OF ROADS AND FOOTPATHS	26.10.70	
12.	DETAILS OF EXPANSION JOINTS AND DOWELS IN FLOOR	28.9.70	
13.	DRAWINGS OF DRAINAGE LAYOUT AND M.H. INVERTS	7.9.70	
14.	HEATING SCHEME LAYOUT	14.9.70	
15.	COLOUR SCHEME AND FINISHING SCHEDULE	16.11.70	

Source: Production & Planning Applied to Building, London, 1971.

Fig 2.7

Northern Counties Power Station

PROGRAMME OF WORK FOR NOVEMBER 1960

Boiler House

Basement floor	Complete concrete to Column 18
Operating floor	Complete concrete to Column 18 (this depends on structural steelwork being handed over)
Amenities floor	Complete concrete to Column 16 (N.B. electric supply to hoist)
Fan floor	Complete concrete to Column 16 (including all plinths)

Turbine House

Basement floor	Complete concrete around No. 4 turbine
North gable No. 5 turbine	Complete asbestos cladding Complete block to 8m level
Sewage Works	Complete plant house
Canteen	Complete brickwork
Gatehouse	Install weighbridge
Coal plant	Complete road to workshop.

Fig. 2.10

The programme chart is drawn up as before but for one week ahead only and perhaps indicating hours. Daily planning meetings are held each afternoon and gang work lists (probably with target man hours) produced for the next day's tasks. Obviously this refinement requires some full-time planning assistance and presupposes the existence of reliable output standards, but it does ensure a maximum utilisation of labour and plant and facilitates more accurate and effective incentive techniques.

On this scale of magnification it is useful to prepare sequence diagrams (see fig. 2.11) for repetitive operations, and minutely detailed daily work schedules (see fig. 2.12) for focal plant units such as tower cranes,

hoists or central batching mixers. Figure shows the order of concreting floor bays where edge formwork cannot be stripped for 7 days. Contract days are given, based on 6 days per week.

SEQUENCE DIAGRAM

1	22	4	25
15	8	18	11
2	23	5	26
16	9	19	12
3	24	6	27
17	10	20	13
29	50	32	53
43	36	46	39

Plan
Fig. 2.10.

DAILY WORK SCHEDULE
FOR
TOWER CRANE

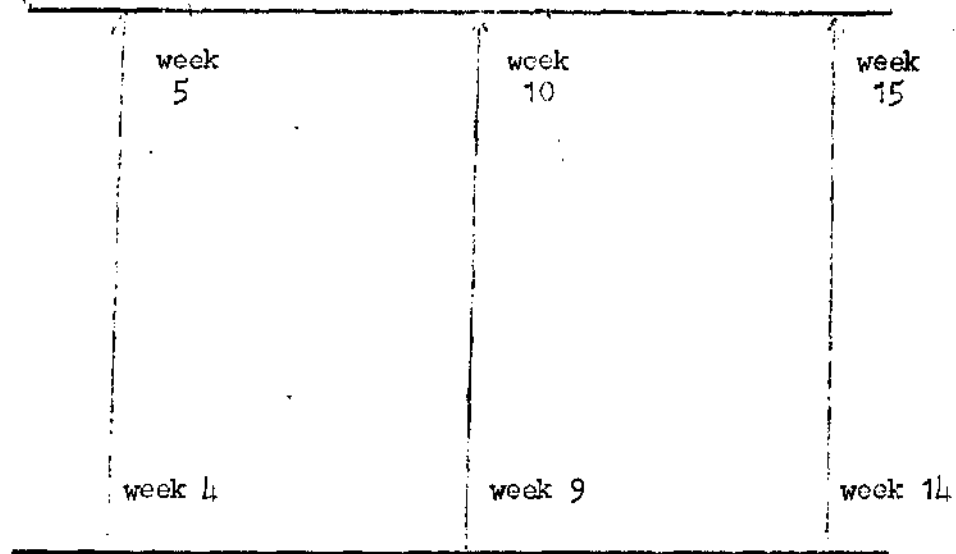
DATE: Tuesday 29th May 1960.

From	To	Gang or Trade	Purpose
8.0 a.m.	10.0 a.m.	Bricklayers	Load-up 3rd. floor
10.0 a.m.	12.0 a.m.	Joiners	Strip staircase shutters
12.0 a.m.	1.0 p.m.	Concretors	Pour lift well 8th floor
1.0 p.m.	4.0 p.m.	Joiners	Erect columns 8th floor
4.0 p.m.	5.0 p.m.	Concretors	Part columns 8th floor
5.0 p.m.	5.30 p.m.	Steelfixers	Fabric for 9th floor

Fig. 2.12.

The production of short term plans at five weekly intervals according to the publication of Liverpool Polytechnic is as shown below:

Overall plan .
 at start based
 upon pre-tender
 plan



Taking for instance that short term planning is done at 'week four' the next planning is done five weeks after i.e. week 9 etc. Though it depends on the complexity of work undertaken, each five weekly planning may be broken down into weekly interval, providing weekly targets for sections or traders involved see below:



The principal motivator at the weekly planning meeting is the site agent. All trades foremen are brought in to discuss the particular Trades section with which they are concerned, and the same procedure for complex operations

should be adopted for the five weekly planning.

As will be seen from the pro-forma weekly plan, short term planning is carried out by days and it is very easy to indicate parts of a day down to hours if necessary.

The planning engineer should attend the weekly meetings. He can prepare the chart and take note of any material or plant requirements that may arise from time to time.

The chart should be updated regularly by the trade foreman, and should be returned each weekend to the site office for transfer to the five weekly chart and filing.

The weekly planning as undertaken by John Laing Construction Limited (U.K.) is in the form of developing the short term planning requirement for a particular week into specific tasks.

The weekly planning meetings are always held on Thursday but not later than Friday.

In order to plan the following weeks work it becomes necessary to first determine what will have been done during the current week.

The following information should be obtained:

- (i) Expected progress of all planned operations shown on both short term and current week's programme at the end of the current week.
- (ii) The current situation regarding materials to be used during the following week by the main contractors and subcontractors.
- (iii) Outstanding orders and subcontracts at the end of the current week.
- (iv) Main contractor and subcontractors plant which is, or will be on site for the following week's work.

A coloured bar is drawn below each programme to show the proportion of work done each week. The coloured bar is repeated in the progress percentage panel where this is indicated in the programme as shown in Fig.

2.13.

There are various methods of recording progress which include the following:-

- (i) Notes, in marking up target sheets
- (ii) Marking up minutes of weekly planning meetings
- (iii) Marking up sketch plans.

Main Operation	Sub Operation	Quantity Approximate	Sub Contract	Progress Percentage				Nov.	Dec.					Jan.				Workin	
				20	40	60	80	26	3	10	17	24	31	7	14	21	28		
								10	19	20	21	22	23	24	25	26	27		
Finishing to Ground Floor	First Fix Joiner																		

55% complete
40% Dec.
15% Jan.

1/2 wk. behind programme

Operation continuing at the end of week 24.

Source: Weekly Planning Course of John Laing Construction Limited Building Division (1978). Fig. 2.13.

An illustration of progress recording is shown in Fig. 2.14. Here the recording process involved is by notes. On the notes the completed works are recorded, both materials and labour are checked.

- e) Information available to main contractor and sub-contractors at the end of the current week.

Furthermore, progress should be recorded on the short term planning so that:

- (i) Overall progress of the contract can be assessed in the light of individual operation.
- (ii) A firm basis can be established for the following weeks plan for each operation.

Progress is recorded by columning up the months in the time scale heading of the bar chart using separate colours for each month.

CARPENTER - SUSPENDED CEILING FRAMING

COMPLETED LADIES W.C.'s (2)
 GENTS W.C.
 PUBLIC BAR
 $\frac{1}{3}$ OF LOUNGE

MATERIAL 600m BATTENS DELIVERED
 CHECK NEXT DELIVERY

LABOUR 2 CARPENTERS

SCAFFOLDING O.K.

INFORMATION O.K.

Fig. 2.14

Source: Journal of the weekly planning course
 of John Laing Construction Ltd. (U.K.)
 building division. London, 1978.

Fig. 2.14 shows one of the methods progress can
 be recorded. For instance the carpenter's work on
 "suspended ceiling framing", the two ladies w.c.,
 gents w.c., public bar, $\frac{1}{3}$ of lounge are completed and
 this can be recorded. The material need are also
 recorded for instance, 600m battens need are already
 delivered.

The total labour required are two carpenters and this is also recorded in the note. Scaffolding and necessary informations are also indicated and recorded as satisfactory.

2.4. SHORT TERM PLANNING AS A TOOL OF COMMUNICATION

Oxley's method of communicating the short term programme to trades foremen, gangers and operatives, include pictorial diagrams, sequence studies, simplified bar charts and work lists.

The method chosen should depend upon the type of work being undertaken and level of literacy of headmen.

The operation of several gangs can be shown on one sheet or diagram, but on large project a separate sheet or diagram will be necessary for each trade or gang. The weekly site meetings are of great assistance in communicating a programme.

Figure 2.15 shown below is a simplified bar chart used for communication to the foremen when weekly planning is done.

CONTRACT: AMENITY CENTRE & OFFICE BLOCK		WEEK NO. 5 WEEK COMM. MARCH, 18					
CONTRACT NO.	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
CARPENTERS (8)	ERECT FORMWORK TO COLUMNS	STRIP FORMWORK TO COLUMNS		ERECT FORMWORK TO BEAMS & FLOOR SLABS			
STEEL FIXERS (3)	ERECT REINFOR- CEMENT TO REST OF COLUMNS	PREPARE PREPARE	REINFORCEMENT & FLOORS		FIX REINFORCE- MENT TO BEAMS AND FLOORS		
LABOURERS (4)	POUR CONCRETE TO ALL COLUMNS		WORK AS DAILY PRO- GRAMME FOR CRANE				
SCAFFOLDERS (2)	ERECT SCAFFOLD	OUTSIDE BUILDING TO ALLOW	POURING OF	CONCRETE			

Source: Management Technique applied to the Construction industry. London, 1971.

Fig. 2.15.

The work of each trade or gang is set down on one bar line, and the chart is read in conjunction with an outline layout drawing which can be used for each floor.

The plan is referenced so that the extent of work to be carried out in the week can be clearly shown. Foremen and gangers should be given a copy of both the chart and the diagram.

For example in Fig. 2.15 an operation such as "Erect formwork to columns" requires eight carpenters working fully on Monday and half day on Tuesday. The same number of carpenters are required to carry out the operation such as "strip formwork to column" and this is expected to start on Tuesday (half day) full day on Wednesday and less than half days work on Thursday.

Liverpool Polytechnic, Department of Building and Civil Engineering (United Kingdom) publication gives the pictorial planning, which illustrates say the concreting of a floor slab, showing the bays and the order in which they are to be concreted, allowing for necessary airing time between bays.

Fig. 2.16 shows an example of concreting a floor slab. The order of laying the concrete would mean that the form of transportation would have to pass over completed slabs, and the dates of casting show the ample airing time.

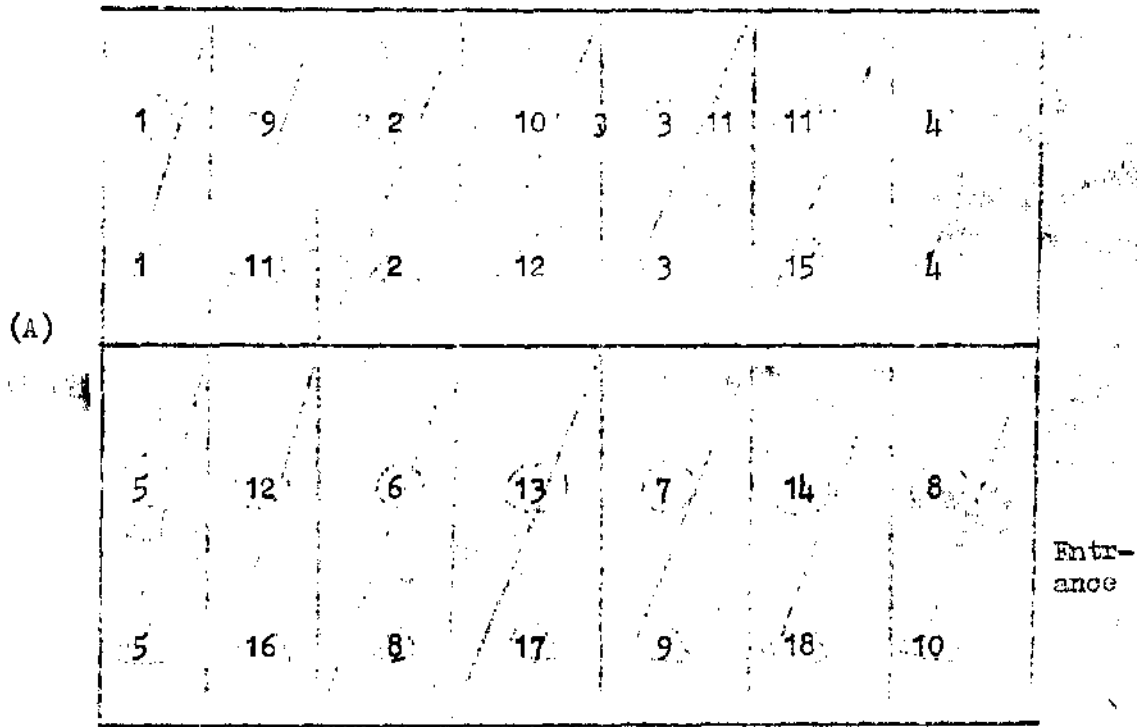


Fig. 2.16.

Key
 Order of laying
 Date on a 5 day week.

But it is not possible, Fig. 2.16B shown below should be used.

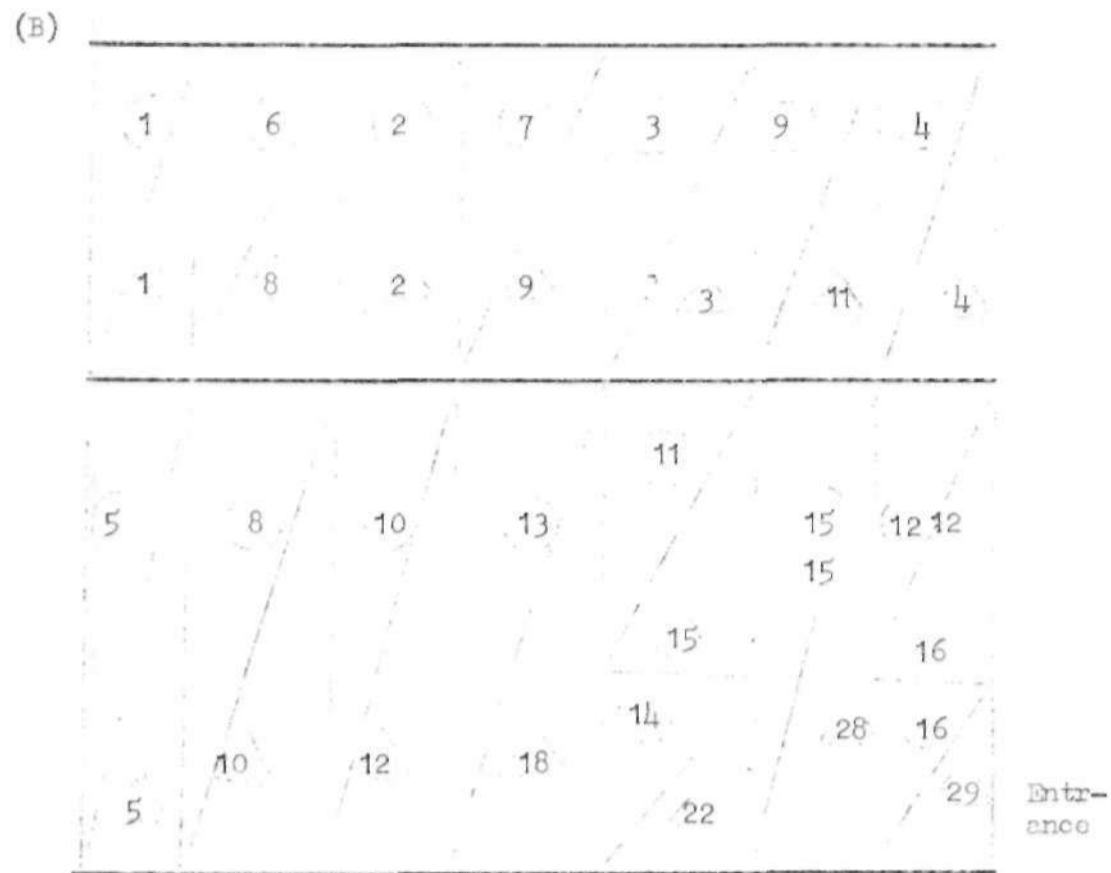


Fig. 2.16

Source: Journal of Liverpool Polytechnic, Department of Building and Civil Engineering.

In this system there is no need for transportation to pass over completed slabs, but to allow two clear bays between bays. The work will take longer (based on a five day week).

The preceding chapter reviews in general the methods employed in preparing short term plans. Different authorities illustrate the nature of this planning as it applies in their environment, taking into consideration all the possible constraints.

It becomes expedient for us at this juncture to investigate into the nature of the short term planning in Nigerian building sites taking into consideration all the possible local constraints.

CHAPTER THREE

3.0. FIELD INVESTIGATION AND ANALYSIS

For the purpose of this investigation, questionnaire were prepared and this was aimed at finding the short term planning technique as applied on the various building sites visited.

The data was collected both from the indigenous and expertrate construction companies. The answers to the questionnaires was given by the contractor's supervisors and the project managers.

A typical example of the questionnaire sheet is as shown in Appendix 1, page while the answer received in each cases are as discussed below:

3.1. Contractor: BREDERO (NIG.) LTD.
Client: FEDERAL GOVERNMENT OF NIGERIA
Location: ABUJA
Contract: SHERATON HOTEL
Duration: 36 MONTHS
Cost: ₦30 millions.

This construction company are responsible for the construction of Sheraton Hotel at Abuja. It is an indigenous company managed by the expertrate.

NO		DESCRIPTION	30	31	32	DATE	DATE
			SA	MO	TU	WE	TH
1	1	PART 1 LEVEL 00 CAST 2					
2	2	PART 2 LEVEL 01 CAST 4					
3	3	CAST 5					
4	4	CAST 6					
5	5	CAST 7					
6	6	CAST 8					
7	7	CAST 9					
8	8	CAST 10					
9	9	CAST 11					
10	10	CAST 12					
11	11	CAST 13					
12	12	CAST 14					
13	13	CAST 15					
14	14	CAST 16					
15	15	CAST 17					
16	16	CAST 18					
17	17	CAST 19					
18	18	CAST 20					
19	19	CAST 21					
20	20	CAST 22					
21	21	CAST 23					
22	22	CAST 24					
23	23	CAST 25					
24	24	CAST 26					
25	25	CAST 27					
26	26	CAST 28					
27	27	CAST 29					
28	28	CAST 30					
29	29	CAST 31					
30	30	CAST 32					
31	31	CAST 33					
32	32	CAST 34					
33	33	CAST 35					
34	34	CAST 36					
35	35	CAST 37					
36	36	CAST 38					
37	37	CAST 39					
38	38	CAST 40					
39	39	CAST 41					
40	40	CAST 42					

Fig 3.1

3.1.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

The site management team which consist of the site manager, Accountant, Engineer(s), supervisors and foremen usually do the planning on the site.

This planning is done every three weeks while the site meeting is done once a week. It is during this weekly meeting that the control of the three weekly planning are made.

No representative from the head office are present during the planning exercise also the subcontractor's representatives are not invited.

Fig. 3.1. shows an example of the three weekly planning of this company. Taking for an example the description number 2, that is, "Part 1 Level 99 Cost 2".

Erection of formworks for this operation starts on the 29th July and it continues till 3rd August, placing of reinforcement starts on the 3rd August and ends on the 7th August, 1982. The pouring of the concrete starts and it was finished on the 9th August. Between the 9th and 14th August, curing of the concrete was allowed while striking of the formworks was between the 16th and 18th August.

3.1.2. COMMUNICATION OF THE PLAN

It is of prime necessity to communicate this plan to

crews for useful task.

Communication is usually verbal by the supervisor to the foremen, the foremen instruct the crew about the task to be accomplished.

3.1.3. ANALYSIS

On reaching this site, it was gather that the work could have been going on normally as planned if not due to delay in some instructions to be given by the Architect.

This sort of short coming could have been avoided if there was proper planning for the requirement schedule of drawings and details as was given in the review of Literature, Chapter Two, page .

In the requirement schedule, the Architect will be notified long before the day of the operation is to take place.

There are no planning engineer at the head office, but usually the General Manager and some other engineers sits to formulate the programme whenever there is a contract.

3.2. CONTRACTOR: LODIGIANI (NIG.) LTD.
Client: FEDERAL GOVERNMENT OF NIGERIA
Location: ABUJA
Contract: ADCP CONFERENCE CENTRE
Duration: 6 MONTHS
Cost: ₦45 Million.

3.2.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

The planning on this site is done monthly which normally coincides with the site meeting.

During this planning exercise, there is no representative from the head office and the subcontractors are sometimes represented.

All the area managers, head of each department are always present for the planning. Weekly planning is done to monitor the monthly planning.

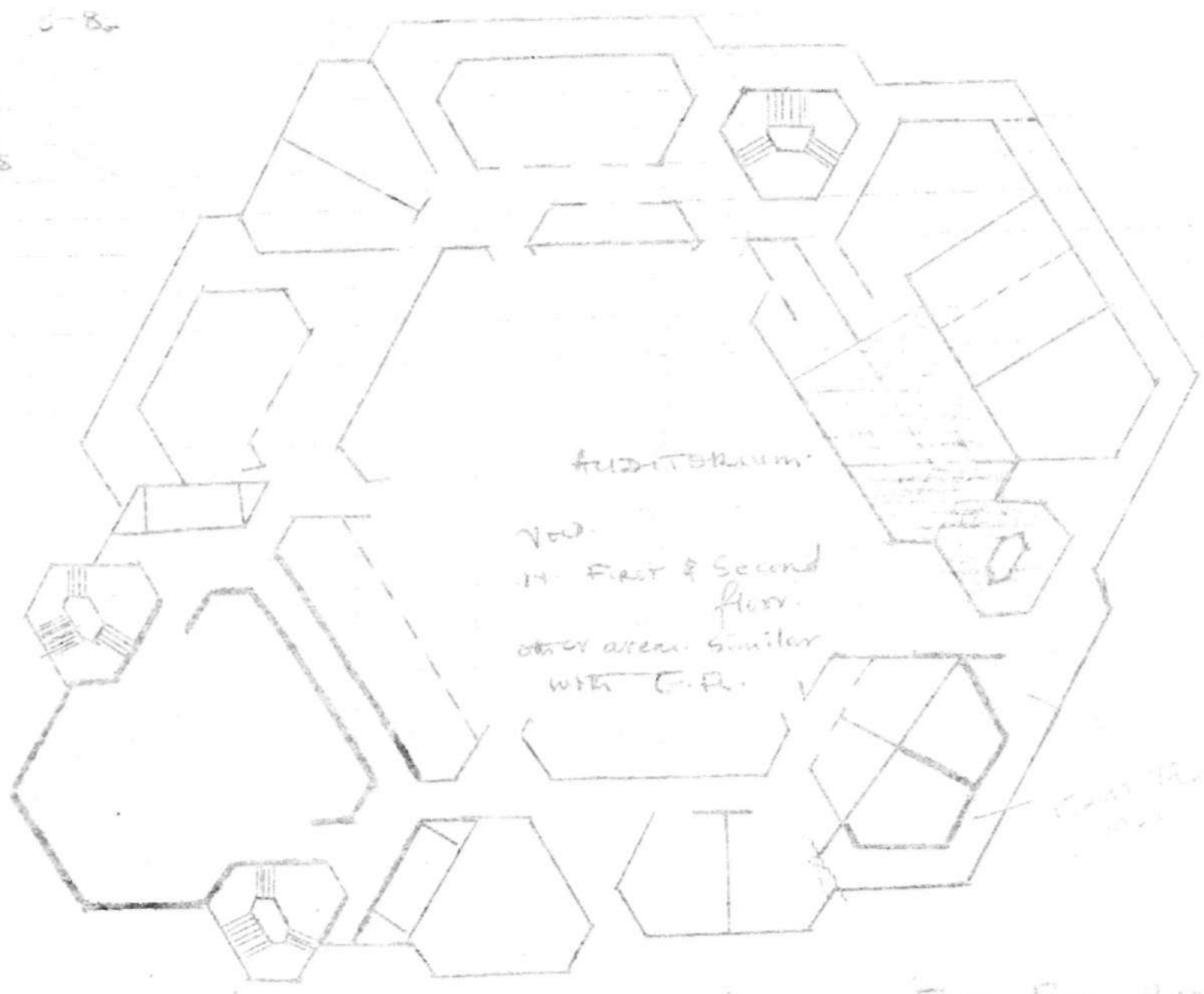
3.2.2. COMMUNICATION OF THE PLAN

Fig. 3.2. shows the way in which communication is done to the foremen.

Copies of the plans for the working area are produced and these are distributed to the foremen with each trade shaded with different colours. In addition to this, the Engineer normally explain the details of the plans verbally.

For an example, in Fig. 3.2. the blue colour indicates the portion to be walled, the yellow portion shaded indicate the slab of the first floor to be casted while the brown portion indicates the second floor slab to be casted.

2-21 0-8
OR LAB



AUDITORIUM
VOW
14 First & Second
floor.
other areas similar
with C.F.

First Floor

First Floor Plan. 3/7
Fig 3.2

The engineer explains the details of these to the foremen, the foremen in turn explain it to the crews.

3.2.3. ANALYSIS

When this site was visited, the work was not going on according to the schedules on the overall programmes of work.

This was due to some delay by the client. Moreover the rain constitutes a lot of hinderance to the progress of the work.

The delay caused by the client should be put into writings so as to make the client aware of any possible extention. While the obstruction by the rain could well be envisaged during the rainy season and proper planning to nullify the effect of rain should have been done.

3.3. CONTRACTOR: LEEPAH GROUP (NIG.) LTD.
Client: FEDERAL GOVERNMENT OF NIGERIA
Location: ABUJA
Contract: 56 2BF ADCE PROJECT
Duration: 13 MONTHS.

Leemah group Nig. Ltd. are responsible for the construction of fifty-six two bedroom flats at Abuja.

	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB
EXCAVATION														
D.P.C. LATERITE HARD CORE														
FLOOR CONC. WINDOW CILL														
LINTOL DOOR & WINDOW FRAMES														
1st FLOOR SLAB														
WINDOW CILL														
LINTOL, DOORS & WINDOW FRAMES														
2nd FLOOR SLAB														
WINDOW CILL														
LINTOL, DOORS & WINDOW FRAMES														
3rd FLOOR SLAB														
WINDOW CILL														
LINTOL, DOORS & WINDOW FRAMES														
WALL PLATE														
ROOF TRUSSES, SLAB, SHEETING, FASCIA														
CEILING, PLASTERING														
PLUMBING, WALL TILES, SOAK AWAY ETC														
FLOOR SCREEDING, TERRAZZO, FLOOR TILES														
JOINERY, ELECTRICAL WIRING														
PAINTING, EXTERNAL & INTERNAL														
GLAZING, ELECTRICAL, HARDWARE FITTINGS														
SITE CLEARING, FINAL INSPECTION														
RETENTION INSPECTION.														

Fig. 3.3 Sketch Programme of Work.

3.3.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

This site planning is done every four months and monthly planning to keep it alive. An example of the four monthly planning is shown in fig. 3.3. where the task to be accomplished between August and November are shown.

For example to take an operation such as internal rendering. This operation was to take two weeks, that is the second and the third week of August. External rendering was to take three weeks, that is the first three weeks in November.

3.3.2. COMMUNICATION OF THE PLAN

Communication is usually verbal and the flow of instruction is from the engineer to the foremen. The foremen in turn instruct the crew about the task ahead.

Working drawings are also given to the foremen to aid them in the construction.

3.3.3. ANALYSIS

When this site was visited, there were so many workers on site that are virtually doing nothing, more so the supply of materials to the site is not regular.

It could be seen in this case that a lot of money is wasted on labour and the management seems not to realise the number of labour required for each occasion. For the

case of irregular supply of materials to the site may be due to the duration in which planning is done, that is every four months.

Comparing this with Bredero Nig. Ltd. where planning is done every three weeks.

3.4. CONTRACTOR: NEW NIGERIAN CONSTRUCTION COMPANY LTD.
Clients: AHMADU BELLO UNIVERSITY, ZARIA
Location: ZARIA
Contracts: NEW AHMADU BELLO UNIVERSITY TEACHING HOSPITAL
Duration: 2½ years
Cost: ₦21 million.

This company is responsible for the construction of the new Ahmadu Bello University Teaching Hospital, Zaria. When the site was visited, they claimed to have planning department at the head office and it is this department that is responsible for the preparation of various programme of works.

3.4.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

There is nothing like short term planning on the site with this company. All they do is to take a section from the site plan and continue working on it.

Weekly meetings are held, and it is during this meeting that the progress on each operation are discussed. Bottle

NEW NIGERIA CONSTRUCTION COMPANY LIMITED

3rd Floor, Turaki Ali House, 3, Kanta
Road, P.M.B. 2173, Kaduna, Nigeria.

Telegrams Satom Kaduna. Tel: 210386,
Telex 71102 Satom NG

Ref. PEFT/K20/18/22.

Date: 5th July, 1982

ABUTH Phase 1A

Weekly Programme

Week Commencing 05.07.82.

Ward Block

Excavate column bases associated with Duct 22, place blinding
concrete continueing.

Duct 22 - Excavate - continueing.

Duct 27 - fix reinforcement and formwork to base, walls and
roof, place concrete - continueing.

Duct 28 - fix reinforcement, place concrete to base.

Duct 25, lower level - fix formwork and reinforcement to walls,
place concrete.

Duct 24, lower level - break into Duct 8, fix reinforcement and
formwork.

Excavate for stairway into Duct 8.

Outpatients Complex

Fill to u/s ground floor slab, place blinding concrete - continueing.

Level 0, columns - fix formwork and reinforcement, place concrete.

Level 1, beams - fix formwork and reinforcement.

Duct 20 - fix formwork and reinforcement to roof, place
concrete.

Branch Ducts off Duct 20 - fix reinforcement to base, walls
and roof, place concrete - continuing.

Manufacture formwork for rib-beam floors.

External Service Ducts

Duct 21 - excavate for columns bases for associated walkway,
place blinding concrete. Excavation continuing.

Main Collector Drain

Place reinforcement and concrete to base, build blockwork,
cast concrete capping, continuing.

Backfill major road crossing.

(Sgd.)

P.E.F. Purry
Foreman-in-Charge.

Table 3.2A.

NEW NIGERIA CONSTRUCTION COMPANY LIMITED

Telegrams: Satom Kaduna
Tel: 210386
Telex: 71102

22, Ahmadu Bello Way,
P.M.B. 2173 Kaduna,
Nigeria.

Ref. PEFB/K20/18/26

Date: 9th August, 1982.

ABUTH Phase 1A

Weekly Programme

Week Commencing 09.08.82

Ward Block

Excavate column bases associated with Duct 22, place blinding concrete - continueing, fix reinforcement and formwork, continueing, place concrete to base.

Duct 27 - Fix reinforcement and formwork to roof, place concrete.

Duct 28 - Fix reinforcement, place concrete to base and walls

Duct 24, lower level - Fix reinforcement and formwork, place concrete to base and walls.

Columns Level 1 - Fix reinforcement, formwork, place concrete - continueing

Column Level 0 - Fix reinforcement and formwork.

Outpatients Complex

Level 0, column - Fix formwork and reinforcement, place concrete - continueing.

Level 1, beams - Fix formwork and reinforcement, place concrete - continueing.

Manufacture formwork for rib-beam floors

Level 1 - Fix decking for rib-beam floors, fix formwork to
beam sides.

External Service Ducts

Duct 21 - Excavate for columns bases for associated walkway,
place blinding concrete, fix formwork and reinforcement,
place concrete. Excavation - continuing. Place
blinding concrete for Duct base. Fix formwork and
reinforcement for base, place concrete.

Main Collector Drain

Build blockwork, cast concrete capping, continuing.
Excavate for continuation of drain.

(Sgd.)

P.E.F. Durr
Foreman-in-Charge.

Table 3.2B.

neck operation are discussed and immediate solution to these are made.

When the weekly meetings are held, neither representative from the head office nor subcontractor's representative are present. With the works that was going when this site was visited, it was claimed that there was not enough plants to carry out the operation.

Table 3.2A and 3.2B show the weekly site meetings where the control of the progress made here being discussed.

3.4.2. COMMUNICATION OF THE PLAN

Communication is only to the supervisor and the engineer verbally. These people in turn explain the detail to the crews.

3.4.3. ANALYSIS

The impression here is that weekly planning is practised as the form of short term planning.

With the absence of the subcontractor's during the site meeting may result in their inability to meet the time they are required on the site, since they are expected to do some planning too.

Had it been there was proper planning the lack of plants on site could have been avoided since a comprehensive plant requirement schedule could have been made.

3.5. CONTRACTOR: SAE CONSTRUCTION (NIG.) LTD.
Client: FEDERAL GOVERNMENT OF NIGERIA
Location: ABUJA
Contract: 1008 FLAT BY SYSTEM BUILDING.

This is an expertize company responsible for the construction of one thousand and eight flats using system building.

3.5.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

There is nothing like short term planning for the actual construction of the buildings. By the middle of the month, all the materials needed for the following month are made available.

3.5.2. COMMUNICATION OF THE PLAN

This is done verbally and once to the crews by telling them the numbers they must complete daily.

In order for this company to meet the deadline for the contract, they must produce two 1 bedroom flat per day, one-two bedroom flat per day, one-three bedroom flat per day and one-half four bedroom flat per day.

3.5.3. ANALYSIS

This is a highly mechanized construction company. Most of the requirements such as cost control on labour, material, plant are computerized.

The work was as planned and they may even finished before the deadline date given for the contract as they are putting more hours to the work.

3.6. CONTRACTOR: ZURU BUILDING CONSTRUCTION COMPANY LTD.
Client: FEDERAL GOVERNMENT OF NIGERIA
Location: ABUJA
Contracts: NEIGHBOURHOOD CENTRE AREA A.

3.6.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

The planning is done monthly and this coincides with the site meetings.

Representatives of the subcontractors and contract manager from the head office are always present during the planning exercise.

The overall programme of works is what they monitor in each occasion of the replanning. For instance "Excavate foundation" starting from the third week in September is to be continued till October ending. Fig. 3.4. shows this operation.

During the monthly meetings the progress made on this operation are discussed and any possible delay are reduced to the minimum.

3.6.2. COMMUNICATION OF THE PLAN

Verbal communication are made and this is from the

Site Engineer to the foremen.

3.6.3. ANALYSIS

There was not much work going on when this site was visited due to shortage of skilled manpower. For instance there was no plumber on the site to do the plumbing works.

The need for training people by the company cannot be overemphasised due to some mistakes that led to demolishing.

The planning technique is somehow similar to that New Nigerian Construction Company but differ considerably from that of Lodigian (Nig.) Ltd. and even Bredero (Nig.) Ltd.

3.7. CONTRACTOR: A. G. FERRERO AND COMPANY LTD.

Clients: KANO STATE GOVERNMENT

Location: KANO

Contracts: ADMINISTRATIVE BUILDING ANNEX II.

This Construction Company is responsible for the construction of administrative building in Kano.

They do not have planning department at the head office.

3.7.1. SHORT TERM PLANNING TECHNIQUE ON THE SITE

The site planning is done every month and weekly site meetings are held to update the monthly planning.

The site supervisor is usually in control of this plan on the site. During the site meetings, the contract manager is usually present while the subcontractors are sometimes represented as the case may be.

3.7.2. COMMUNICATION OF THE PLAN

Verbal communication is done by the supervisor to the foremen. The foremen in turn instruct the crews.

The preceding discussions give a brief review of the various methods of existing short term planning on some selected sites and their methods of communicating these plans. It is observed that different companies have different approaches to short term planning but they all aim at completing the project on schedule.

It then becomes pertinent here to formulate a short term planning model on the basis of the existing methods investigated, but which, tries to minimize the various constraints highlighted by our analyses.

CHAPTER FOUR

4. A PROPOSED SHORT TERM PLANNING MODEL

We propose here a short term planning model which will compose of a graphic model modified with local constraints identified from investigation of short term planning techniques in the country's building sites.

Our propose model will then be tested to solve the particular problems of short terms planning identified in the country.

Planning on the site requires the knowledge of the followings:-

- A) Estimate what would have been done at the end of the current period.

Note: i) current labour resources } including
 and current materials } similar
 } operations on
 } same programme
 stocks } using the
 } same labour
 } and/or materials
 } plant and
 } information.

- ii) Plant in use and current position of information, drawings and schedules.

- B) Determine what you would like to have done during the next planning period.

- consider (i) Effect of operations, current progress on contract duration.
- (ii) Remaining duration of operation.
- (iii) Effect of future progress on:
- a) Preceding operation on which this operation depends.
 - b) Following operations dependent on this operation.
- (iv) Hire/Termination of plant associated with the operation.
- (v) Acceleration of information release and notice to subcontractors and suppliers (if applicable).

① Establish that sufficient resources are on site or would be available to enable section (B) to proceed as planned, that is, the availability of sufficient resources for the next planning period.

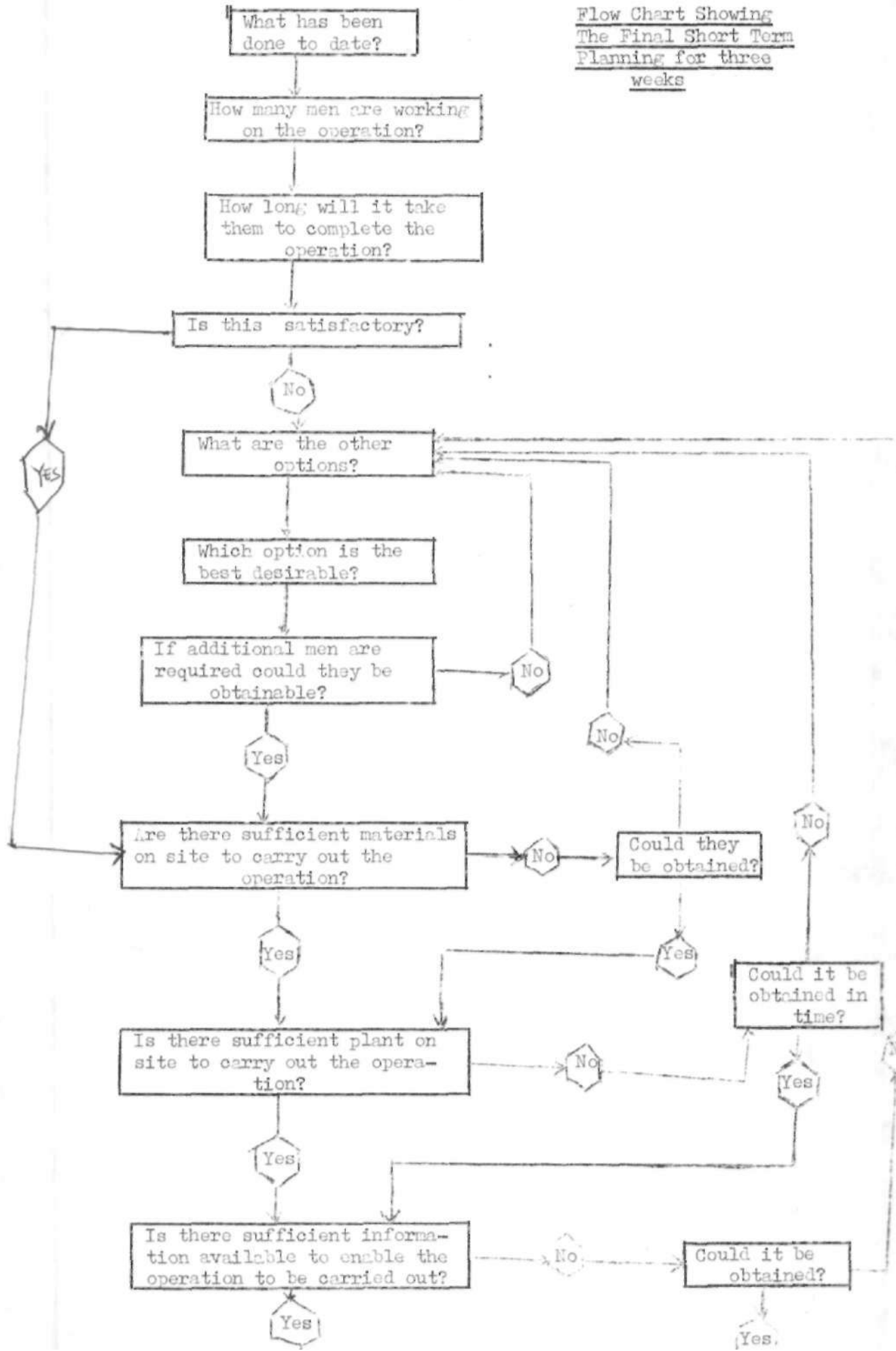
- Consider:
- a) labour
 - b) material
 - c) plant
 - d) information.

Examine cost implication if additional resources are obtainable.

Return to section B where three weekly planning is done and amend to suit revised resources if original requirements cannot be met.

- D) Finalise plan of actions to meet the next three weeks target.
- E) Communicate this plan to the productives.
- F) In the case of disturbance by rain, replan the three weekly planning to meet the schedule on the critical operations, that is the operations if delayed will lead to an extension of time for the contract.

Flow Chart Showing
The Final Short Term
Planning for three
weeks



This flow chart enable us to determine what the firm has done so far. This will clearly show the planner if progress has been made and if work has been going on as scheduled.

Moreover, the material, labour, and plant needed on the site are ascertained and if it requires more of these, the possibilities of getting them are discussed and most probable option could be adopted.

When all the requirements are acceptable the plan is finalised and then communicated to the productives.

The finalised plan can be presented in a tabular form for the needed resources if any. The table then shows the resources needed.

4.1. COMMUNICATION OF THE FINALISED PLAN

When the three weekly plan had been finalised, communication of the plans for task performance is very necessary.

The final operation of the three weekly cycle is to produce and distribute details of the plan as individual targets to all those responsible for carrying out site operation.

Their purpose are:-

- a) To communicate details to those responsible for carrying them out.
- b) To provide a target against which progress can be measured, thus forming a means of site control and an essential part of the following three week's planning cycle.
- c) To provide a detail record of site progress for the quantity surveyor.

4.2. PROPOSED WAYS OF COMMUNICATING THE PROGRAMME

4.2.1. MINUTE OF THE MEETING

These are action minutes with details of specific task to be carried out by individual trades and gangs.

This type of presentation could be an advantageous use on contract containing a high degree of repetitive work e.g. housing estate where the works begin at the same time.

Minute of weekly planning held on			
for week commencing			
Operation	Complete	Trades	Commence

Fig. 4.1. Minute of weekly planning.

4.2.2. TARGET SHEETS

These illustrate duration and interdependence of different parts of the same operation. They also enable activities such as calling up of materials, plant etc. to be clearly shown in relationship to the operations they influence.

TARGET FOR BRICKLAYERS AT COMMENCING								
GANG & OPERATION	WED	THUR	FRI	MON	TUE	WED	THUR	FRI
LOAD SCAFFOLDING		●	ORDER LABOUR					
BRICK TO PARAPET		●						
MATERIALS								
FACINGS	●	CALL UP			DELIVER		DELIVER	
COMMONS	●			DELIVER				
SPECIALS					DELIVER			
MORTAR								
PLANT				ORDER		ORDER		ORDER
FORK LIFT TRUCK				● FOR FACINGS		● FOR FACINGS		● FOR MORTAR (MORTAR)
PROJECT ASPHALTE					UNLOAD FACINGS		UNLOAD FACINGS	
LABOUR UNLOADING BRICKS				COMMONS	SPECIALS			
				GEN. LAB. + CARP. LAB.				
SCAFFOLDERS		ORDER LABOUR				LOWER SCAFFOLD		

Fig. 4.2. TARGETTING

4.2.3. Sketch Plans, Elevation

These have the advantage of being easily read and understood by those carrying out the operations.

They are particularly useful when an inter-related sequence of operations need to be shown. For example, in shuttering reinforcement and concrete slab. However, supporting activities such as calling up materials are less easily highlighted in this form of illustration.

AN ILLUSTRATION OF THE APPLICATION OF THE PROPOSED MODEL

PROGRAMME	
ITEM: 420 MECHANICAL INSTALLATION	
CURRENT PROGRESS	50% complete. 1½ weeks behind programme labour available
RESOURCES:	All materials on site.
EFFECT OF CURRENT PROGRESS ON CONTRACT DURATION:	-
REMAINING DURATION OF OPERATION:	Completion in 1 week and to achieve programme date faster rate of progress needed.
EFFECT OF INTENDED PROGRESS ON PRECEDING OPERATIONS:	None
EFFECT OF INTENDED PROGRESS ON FOLLOWING DEPENDENT OPERATIONS	Current delay could affect floor screeding.
PLANT HIRE AND TERMINATION	-
LABOUR RESOURCES	Ask from planning engineer if present strength is sufficient to meet pro- gramme requirements
MATERIALS	On site.
PLANTS	INFORMATION Available
COST COMPARISON	-
SUMMARY OF TARGET	

Data obtained from the weekly planning journal of John Laing
Company and used to illustrate the short term model.

Table 4.1.

Information obtained from the flow chart earlier discussed can be presented as shown in Table 4.2.

	Operation	Number of men working	Duration	Remarks
1	Plaster wall	2	7	O.K.
2	Floor screed	3	6	Not o.k.
3	Paint wall	3	5	O.K.

Table 4.2. Crews/Duration Table for each operation.

This type of table enable us to determine whether there are sufficient labour working to meet the schedule. Taking for instance operation 2, floor screed where three men are working on the floor screed and they are expected to do it for six days. From the remark column one can see that the labour strength is not sufficient to meet the six days target.

S/NO.	OPERATION	MATERIAL REQUIRED	PLANT REQUIRED	REQUIRED INFORMATION
1	Plaster wall	100m ³ of mortar	-	-
2	Floor Screed	50m ³ of Sand/cement mix	-	-
3	Painting	13 gallons of Emulsion paint	-	Architect yet to give the colour of the paint

Table 4.3. Required resources and information per operation.

S/NO.	OPERATION	MATERIAL NEEDED	LATEST DATE	PLANT NEEDED	LATEST DATE	INFORMATION NEEDED
1	Plaster wall	John & Co. Ltd.	17/10	-	-	immediately
2	Floor Screed	John (Wig.) Ltd.	20/10	-	-	-
3	Painting	Paul the painter	23/10	-	-	immediately

Table 4.4. Suppliers information table.

Table 4.4. shows an example of the quantities of materials, plant and information required for each operation while table 4.5. shows who and when these materials and informations must be made available on the site to avoid any delay.

PLANT SCHEDULE

CONTRACT

Machine	Accompanying Equipment	Date required on site	Date of release from site	Source of supply	Remarks
14/10 Concrete	Scrape haul	21/7	-	Our own	
22 RB Excavator	Fitted dragline backacter	2/7	31/4	To be hired	

Table 4.5.

The plant schedule should be fomulated every three weeks too as the case may be.

The above shows a typical plant schedule where the type of plant required, the date it should be on the site and the date of release if hired.

All the above are means of communication to the literate foremen to enable them carry out their various tasks.

In the light of the three weekly planning, weekly planning should be done to keep the three weekly planning alive. The same format for the three weekly planning is applicable to the weekly planning.

In the case of unavoidable disturbance say by rain, the activities that are critical should be immediately replanned to meet the schedule.

It is anticipated that if three weekly planning is carried out the country's building sites for contract not exceeding five years duration, the cost and time of building projects could be within the range stipulated in the estimate.

Moreover to keep this three weekly planning alive, weekly planning which may or may not coincide with site meetings should be adopted.

Representatives both from the head office and the sub-contractor should be present to enable them to be aware of the programme and give additional input to the planning process.

CHAPTER FIVE

5.0. CONCLUSIONS

5.1. SUMMARY

- i) Short term planning should be in the form as depicted by ^A flow chart on page 45 to be used on site during the short term planning formulation.
- ii) Short term planning should be done every three weeks to facilitate maximum efficiency on the site, to save both the waiting time and overall cost for the building contract.
- iii) Weekly site meetings should be held on the site to iron out some bottle neck operations among other things.
- iv) Weekly planning should be done to update the three weekly planning proposed.
- v) Short term planning should be communicated effectively to the foremen to avoid misinformation.
- vi) In formulating short term planning, representative both from the head office and that of the subcontractors should be present.

5.2. PROPOSAL FOR FURTHER RESEARCH

- i) There is need for quantitative analysis to be carried out on short term planning method.
- ii) There is not much research done on this aspect of construction hence further research work should be done in this area of planning.
- iii) Research on short term planning methods suitable for construction contract above five years duration should be carried out because the research in this thesis is for contract duration not exceeding five years.
- iv) Research on delegation of authorities with regard to short term planning should be carried out.

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APPENDIX ONE

SHORT TERM PLANNING QUESTIONNAIRE SHEET

CONTRACT: _____

CONTRACTOR: _____

QUANTITY SURVEYOR: _____

DATE: _____

QUESTION	ANSWER
1. Do you have a planning Department at the head office?	
2. How often do you have your site meeting?	
3. When do you do your short term planning?	
4. Do you have somebody on site to look after such planning and control?	
5. Do you have any representative from the Head office when you are doing your short term planning	
6. Are your subcontractors present when you are doing the short term planning?	
7. How is this plan communicated to the foremen/crews?	

QUESTIONS	ANSWER
8. Do you have sufficient materials to work with presently?	
If No, why?	
9. Do you have sufficient labour to carry out the present operation?	
- If No, why?	
10. Do you have sufficient plant to carry out the present operation?	
- If No, why?	
11. Are there sufficient money for the present operation?	
- If No, why?	