بسم الله الرحمن الرحيم

CPAS مركز الدراسات التخطيطية والمعمارية

CENTER OF PLANNING AND ARCHITECTURE STUDIES

الدورة التدريبية الرابعة

" أدارة عمليات التشييد والبناء "

مجموعة محاضرات

المهندس / آدمز

لعام ١٤٠١هـ - ١٩٨١م

14, EL SOBKY ST., M. EL-BAKRY—HELIOPOLIS—CAIRO—EGYPT. ١٤ ش السبكى منشية البكرى - هليوبوليس - القاهرة - ج. م. ع
P.O.B. : 6 SARAY-EL-KOBBA — CABLE : ARFLANEC ص.ب : ٦ سراى القبة - تلغرافيا : اربلانك .
TEL. : 603843 — 603397 — TELEX : 93243 CPAS UN ت : ٦٠٣٨٤٣ - ٦٠٣٣٩٧ تلكس : CPAS UN ٩٣٢٤٣

PREPARATION OF A BAR CHART PROGRAMME

By: B.P.G. Adams
Project Planning Engineer
Higgs and Hill Construction
Egypt S.A.E.

Definition of a Bar Chart:

The bar chart is a diagram on which are recorded against a time scale the target dates by which it is planned to commence and complete the major blocks of work involved in the project.

The bar chart has the advantages of being simple to understand and quick to assess the relative progress position of each activity. It is also possible to determine the overall position of the project from a simple calculation of percentage completion against time.

Preparation of a Bar Chart:

The first thing to do when preparing a programme of any sort is to determine a list of activities that will appear on the chart in the sequence that will be necessary to complete the works.

For example if we are preparing a programme for a small part of a project such as the foundation raft then the following would be the activities required:

1. Level ground for piling.
2. Piling
3. Excavate to depth of foundation
4. Prepare and blind base
5. Cut down piles
6. Perimetes form work
7. Reinforcement
8. Construction joints between concrete bays
9. Concrete.

Now that the sequence of operations has been established the next stage can be reached.

Quantify the Activities:

From the drawings and / or the Bill of Quantities for the project measure the quantity of the activity in a relevant unit such as

i Cubic metres
ii Square metres
iii Linear metres
iv Numbers

for the purpose of this exercise, we shall use the same base and calculate as follow:

1. Level ground for piling = 30m x 30m x 0.15m = 135 m^3
2. Piling = 500 piles
3. Excavate foundation = 30m x 30m x 2m = 1800 m^3
4. Prepare and blind base = 30m x 30m = 900 m^2
5. Cut down piles = 900 x 2m x $\frac{22}{7}$ x .225 x .225= 285 m^3
6. Perimetes formwork = 4 x 2m x 30m = 240 m^2
7. Reinforcement = 500 tonnes
8. Construction joints = 19 x 2m x 10m = 380 m^2
9. Concrete = 30m x 30m x 2m = 1800 m^3

The next step, after calculating the quantities is to determine the RATE at which the item will be done. At this stage the machine resource is selected and its relative output given; for example for the excavation works it will be necessary for a machine excavator to be used. For the first operation it will need a front bucket and for the third operation a back-joe attachment will be necessary. A suitable machine would be a Massey Fergusson 50 HB.

The placement and mixing of concrete should then be considered i.e. cranage: mixer: pump and this will vary from project to project as each need is assessed.

For the purpose of this exercise we will use a Benford PXZo pan mixer with the concrete being placed using a skip and towes crane. A further consideration on the concrete would be the preparation of a "BAY LAYOUT" to determine the sequence of pouring concrete.

The cutting down of the piles is an operation that will involve a compressor and concrete breaking tools. The size of machine must be evaluated against the amount of cutting away required.

For ease of reference, a schedule as below is necessary:

Operation		Quantity	Rate	Man/ Machine Hour	Labour + Plant	Duration	Plant
1. Level Ground	M^3	135	$5m^3/hr$	27hrs	18+16+2L	27hrs	Excavator
2. Piling	No	500	5No/day	100days	1 rig	100day	Piling mig (S/F)
3. Excavation	M^3	1800	$10m^3/hr$	180hrs	18+16+2L	180hrs	Excavator
4. Prepare & Blind	M^2	900	$6m^2/hr$	150hrs	5	30hrs	
5. Cut down piles	M^3	285	$.15m^3/hr$	1900hrs	48	475hrs	2x4 tool compr ssc
6. Formwork	M^2	240	$1m^2hr$	240hrs	2	120hrs	
7. Reinforcement	ton	600	15/t/hr	4000hrs	10	400hrs	
8. Joints	M^2	380	$1m^2/hr$	380hrs	2	190hrs	
9. Concrete	m^3	1800	$15m^3/hr$	120hrs	5+18 16 42	15day	1 Crane 2 conc 1 mixes Skips

The programme is now prepared as attached sheet.

The last part of preparation is the adding to the programme of a labour HISTOCRAM which will determine the number of operations required on site at any one time.

Materials and Information:

An important part of PLANNING is the scheduling of materials required and the placing of orders for each element so that the materials are on site in good time for the activity to commence.

For example for the Cairo Plaza Project, where many items for the works are coming from overseas the additional time for shipping and custom clearance must be added to the procurement period.

The delivery of materials to site is obviously critical to the progress of the works and as such information on which materials to use must be received from the Design Team.

Therefore, after the preparation of the main programme a schedule of information required is necessary. To arrive at a time when the Contractor needs to place an order for an item of material, the procurement period can be built up as follows:

Work Background

Storing or materials on site	2 weeks
Shipping + Clearance	6 weeks
Awaiting Shipment	2 weeks
Manufacture	12 weeks
Preparation of drawings & approvals	8 weeks
Pricing and Placing order	6 weeks
Preparation of documents	2 weeks
Total	38 weeks

Thus, for a major element to commence the basic information must be available some considerable time before the element is due to start on site.

An example of an information required schedule is attached.

The programme is now prepared, the information schedule is produced, the materials required have been scheduled and ordered.

The time has come to monitor the progress of the works. This is simply done by measuring on site the quantity, as percentage, of each element being progressed and entering it against the bar chart diagram. For example if 25% of an element 12 weeks in duration has been completed then 3 weeks of the bar can be coloured in. It is then easy to visualise how far in front or behind programme each element is, and an average can then be taken agaist all the items and an overall assessment made.

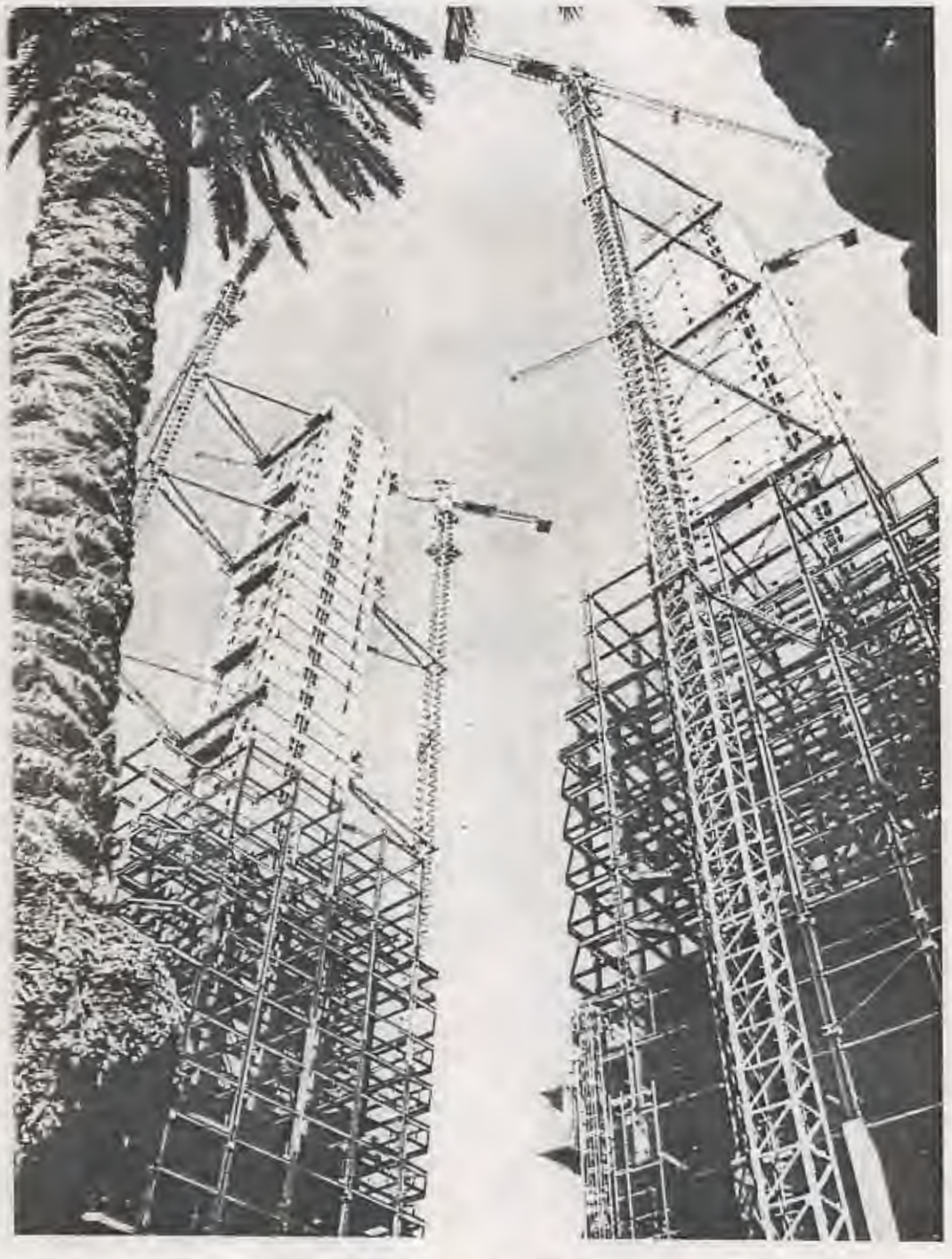
Once the Contract Programme has been produced, further detailed programmes are required. Firstly a split can be done to produce programmes i.e. SUBSTRUCTURE: SUPERSTRUCTURE FINISHES INTERNAL AND EXTERNAL: EXTERNAL WORKS.

Each of these major elements can then be split again into stage programmes showing in greater detail the work to be carried out over a period of eight to twelve weeks. Stage programmes are then split again into weekly

programmes which show in infinite detail the daily tasks for the current week. The stage programmes and weekly programmes are also used for re-sequecing the works to bring the Contract back to even time.

NEWS AND VIEWS

Cairo Plaza Development, Egypt



Previous issues of the Crown Journal have described this development, being carried out by the Company, for an Egyptian property investment company, under a Management Fee Agreement in excess of £45 million.

The construction of the central cores by the slip form method was described fully in our Summer 1979 issue.

The twin 39-storey tower blocks will rise to a height of 139m above ground level and the two blocks are referred to as the Apartment Hotel block and the Burohotel block. The Apartment Hotel block will provide about 600 rooms, with public facilities on the second

floor including a restaurant, bars and a coffee shop. Apartments may be planned as two, three or four-bedroom units, with the largest luxury suites having frontages facing the Nile.

The Burohotel block is combined with a shopping centre. There are three podium levels, thirty office floors and 6 plantroom floors. The three-storey shopping and exhibition centre connects to all parts of the development and the entire area will be linked, by escalators, lifts and stairs to the twin tower blocks. Direct access will be provided from the basement car park.

At the southern end of the site there is a five-storey office building that rises above the podium in double octagonal form.

Our Group photographer, David Robinson, visited the Cairo site in March and a selection of his pictures have been chosen to make a pictorial report on the progress of this important and exciting project.

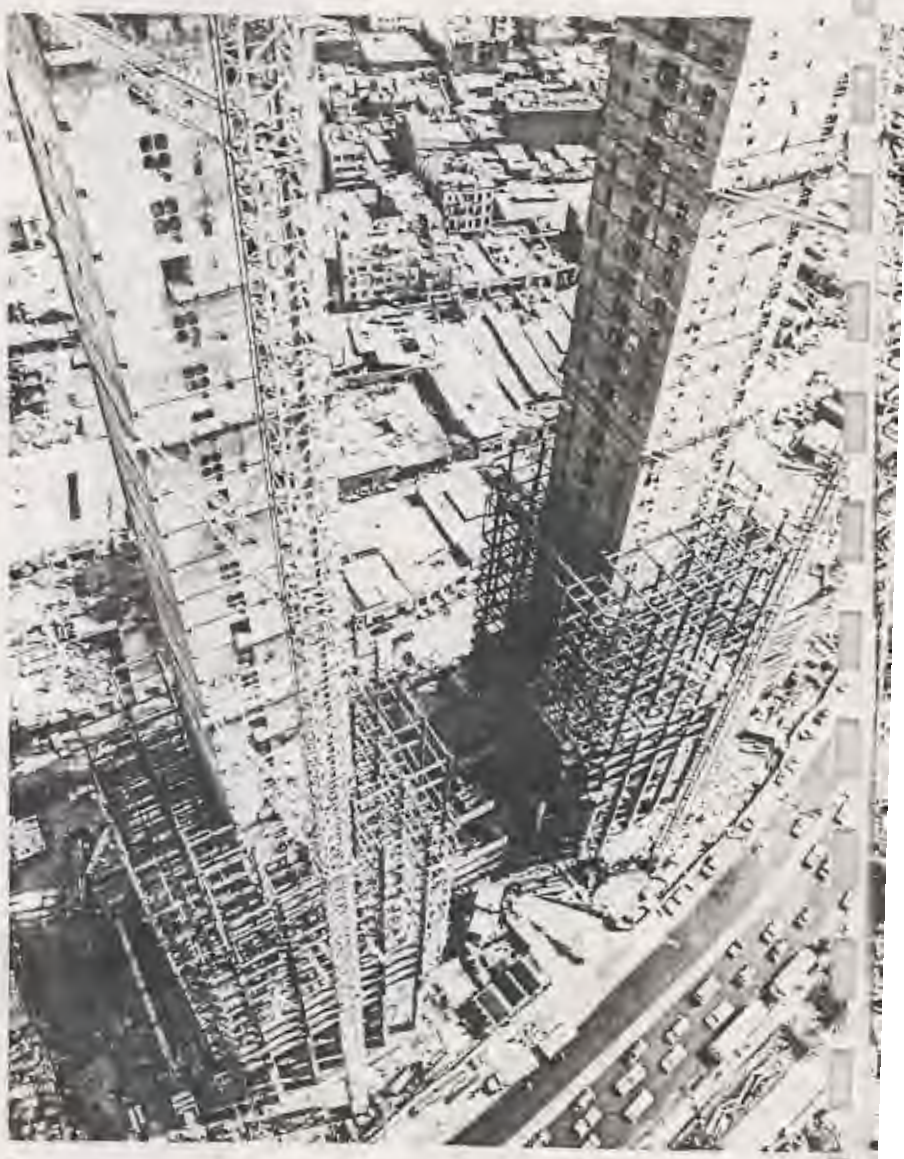
The only construction techniques illustrated by these pictures, that have not already been described in previous features, are those being used for the erection of the steel framework and for the fixing of the metal decking.

The structural steel frame that surrounds the two reinforced concrete service cores is being erected by the Cleveland Bridge and Engineering Company Limited. The frames will rise to the full 139m height of the tower blocks and each frame has a plan size of 35m by 35m. To assist in the erection of the steelwork out F3/29 Potain cranes are standing at a maximum height of 175m, some 30m higher than the giant Giza Pyramids! The statistical facts on the steelwork also make interesting reading – 6,000 tonnes of steel are being used in 12,000 sections, a truly massive structure.

The Cleveland Bridge and Engineering Company are also responsible for fixing the Holorib metal decking which is being secured to the steel beams by means of 500,000 welded shear studs. This metal decking forms a permanent shuttering for the floor slabs and requires the minimum amount of temporary propping during the construction of the concrete floors.

In the early stages of the steelwork erection, certain of the major structural columns could not be lifted into their final positions using the available fixed or mobile cranes, so Cleveland

1



2

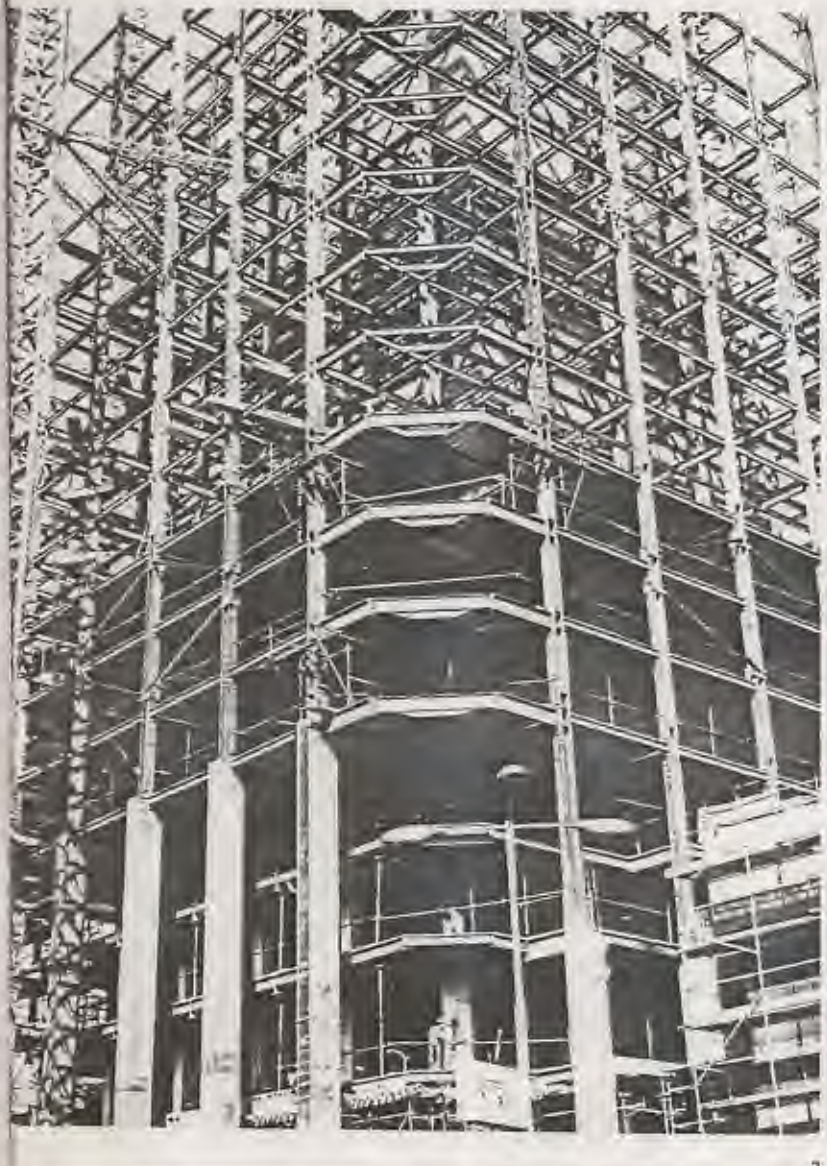
Bridge had to revert to the time-honoured and traditional method of 'stick and winch'. The majority of the steelwork has, however, been erected using our Potain cranes with the help of closed circuit television, bilingual banksmen and a very high degree of expertise by our expatriate H and H crane drivers.

In addition to the conrete floor slabs the steelwork columns are to be encased either in concrete or blockwork. The steel beams are treated with 'Ceramospray' to give maximum fire protection.

Project manager: D. C. Wade; *deputy project manager:* J. R. Allen; *Project Surveyor:* R. W. Keen; *project planner:* B. P. G. Adams; *chief accountant:* M. J. Gale; *senior quantity surveyor:* G. W. Love; *quantity surveyor:* I. D. Barrett; *surveyor:* J. M. Gross; *superintending engineer:* J. A. Thomas; *senior engineers:* T. J. Aitchison, D. D. Hall, J. Wood; *site engineers:* G. J. Davis, S. J. Burrows; *materials engineer:* W. G. Kennedy; *project planning co-ordinator:* F. Legg; *project accountant:* E. J. McKay; *office manager:* D. E. Kelly; *material scheduler:* J. R. Collins; *senior agent:* T. V. Brandt; *agents:* P. Coffey, J. R. Cross; *general foremen:* C. R. Griffith, G. M. Lake, S. W. Piggott; *foreman carpenters:* A. Cousins, C. J. Foster, K. MacDonald, J. M. Walsh; *foreman scaffolders:* L. Cuddy, T. E. Hickson; *foreman tower crane erector/electrician:* J. R. Hall; *electrical supervisor:* R. A. D. Jeffrey; *foreman electrician:* P. Morgan; *foreman steelfixer:* W. Newby; *electrician:* K. A. Barton; *plant supervisor:* J. P. Donovan; *plant operators:* J. W. Birch, P. J. Davy, M. Galloway, R. Prescott, P. Sweeney; *plant fitters:* P. Dixon, D. Jones.

Architects: Associated Continental Architects (Gulf) and A. Gamil Shanab
Consulting Engineers (Structural): White Young and Partners
Consulting Engineers (Services): Williams Sale Partnership
Quantity Surveyors: Widnell and Trollope (Middle East)

1. *The model of the development.*
2. *The two towers as seen from high level.*
3. *The mass of steelwork to the Apartment Block, showing the box columns that will form a feature to the main entrance.*
4. *The completed structure of the South Block with finishings being carried out.*



3

4

1

2

1. *The development as seen from the Corniche.*
2. *The Burohotel structure as seen from the top of the Apartment Block. The openings formed in the tower are for lift lobbies, doors and services.*
3. & 4. *The Holorib decking being laid by structural steelwork subcontractor The Cleveland Bridge and Engineering Company Limited.*
5. & 6. *Intrepid 'spider-men' at work on the steel frame.*
7. *Some of the incredibly varied buildings that form the City of Cairo, as seen from across the top of the Apartment Block tower.*

3

4

5

6

7

Mr. Bernard Peter Gillet Adams

NAME: Mr. Bernard Peter Gillet Adams.

DATE OF BIRTH: 3rd March 1948.

ACADEMIC DEGREES: *Higher National Diplom" Building Technology & Management."

* Wstitute of Building" Part I & Part - Building Tdchnologu"

PRESENT OCCUPATION: Project Planning Engineer : Higgs & hill constrection Egypt S.A.E. (Cairo Plaza) (Contract Value £ 65 Million).

PREVIOUS EXPERIENCE: * Site Planning Engineer " London Weekend T.V.(Value £12 Million). 2YRS.

* Senior Planning Engineer" ST. Georges Hospital " (Value £25 Million)4YRS.

* Senior Planning Engineer " National Westminster Computer Center" (Value £ 45 Million) 2YRS.

RESIDENCE ADDRESS: House 17 , Street 27C NEW MAADI.