

NI(GP)60)3

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

GENERAL PURPOSES COMMITTEE

Building Estimates for NIMROD

Paper by the Chairman of the Project Committee

1. The General Purposes Committee requested at the last meeting that the cost of the Project should be reviewed and that a contingency figure be included within which the whole project would be completed.
2. A detailed review of the building estimates has been undertaken by the Project Group, the Southern Works Organisation of the U.K.A.E.A. and the Consulting Engineers and Quantity Surveyors. A copy of the report from the Southern Works Organisation is attached, Appendix I.
3. This review takes into account all known extras to the original contracts and all claims which had arisen or were anticipated on the 30th November, 1959, but excludes increases resulting from wage awards under Clause C.V.C.2
4. As the review and subsequent investigation continued up to a few days prior to the meeting of the General Purposes Committee the estimates have not been submitted to the Project Committee for discussion. Because of the urgency the chairman, Mr. D.W. Fry, has agreed to this paper being submitted direct to the General Purposes Committee.
5. The extra requirements included in the estimates which have not been previously reported are as follows:-

	£
(a) Provision of kerbs, road-drainage and footpaths for Phase I	10,000
(b) Provision of extras and remedying of minor building defects during occupation of Laboratory and Office Block (Reference 1(d) Appendix I)	3,000
(c) Miscellaneous extras mainly to satisfy Safety requirements (Reference 1(e) to 1(h) Appendix I)	9,900
(d) Provision in the Civil estimates for attendance on the machine installation contractors and final painting of the plant. The review shows no provision has been made previously	50,000
	<u>£72,900</u>
6. The Southern Works Organisation report under-estimating by the Consultants on the following items:-

(a) Under-estimating of the amount of complex building work in the Magnet Room (Reference 1(c) of Appendix I)	26,500
(b) Miscellaneous minor under-estimation of Civil items not connected with Magnet Room (Reference 1(j) Appendix I)	3,000
(c) Under-estimating on Mechanical and Electrical items (Reference 2(a), (b) & (c) Appendix I)	16,200
	<u>£45,700</u>

7. The Southern Works Organisation have informed us of the following claims which have arisen or are anticipated in the near future:-

(a) Negotiated increased rates for concreting, formwork, and reinforcement (Reference 1(a) Appendix I)	£ 83,000
(b) Adjustment to the main civil contract to allow for increased standing charges in respect of the extension of Phase I works. These extras to the contract have previously been reported to the General Purposes Committee. The terms of the contract indicated that adjustment would be made if the extent of the work was substantially increased (Reference 1(b) Appendix I)	72,000
(c) Messrs. Chivers have claimed that they are entitled to the same rates for the extra work on their Phase I contract as they have been awarded for the Phase II work. The basis of their claim is that the work is being done concurrently with Phase II and it is unfair to use rates which were particular to the work associated with their initial contract	25,000
(d) Anticipated miscellaneous claims from nominated sub-contractors to Messrs. Chivers	4,500
(e) Miscellaneous claims anticipated from M. & E. contractors	17,700
	<u>£202,200</u>

Four of the above claims will be the subject of detailed contractual discussions and the final settlement may be less than the figures indicated.

8. It has been customary to include in the building estimates the fees payable to Merz & McLellan, Faulkners & Partners and the Development and Engineering Group of the U.K.A.E.A. Scaling the fees up pro rata in proportion to the increased estimates is as follows:-

	Approved fee	Estimated revised fee
Merz & McLellan) Faulkners & Partners) Quantity Surveyors)	147,000	188,000
Development and Engineering Group of the U.K.A.E.A.	85,000	115,000
<u>TOTAL</u>	<u>£232,000</u>	<u>£303,000</u>

9. In regard to contingencies a figure of 5% has been added to the Civil and M. & E. revised estimates. This overall figure is considered reasonable since the Alternator House and Converter Room are in the early stages of construction, but on the other hand the Magnet Room is nearing completion. A figure of approximately 2½% is usual for the final measurements and settling of accounts, which leaves only 2½% for truly additional works in the contingencies class. In regard to fees these have amounted on the present contract to 11.7% of the capital cost of the works. It has been mentioned by Southern Works Organisation that they contemplate a 15% overall fee to cover the services given to the National Institute.

If this is agreed then an increased fee will be payable for that part of the work completed from the setting up of the Southern Works Organisation on the 1st September, 1959. The contingency figure on fees is included to cover the fees payable to consultants if contingency work is proved necessary, and also for any increases which may be claimed by the Southern Works Organisation under their newly proposed terms.

10. The total cost of all building works is summarised in the following table:-

	Original Treasury Approval	Present Treasury Approval	Latest Estimate reported to G.P.C.	Revised Estimate to 30.11.59	Contingency	Estimate including Contingency
	£	£	£	£	£	£
Main & Ancillary Buildings	1,400,000	1,591,000	1,601,000	1,887,900	94,395	1,982,295
Engineers & Services	400,000	587,000	667,000	700,900	35,045	735,945
Fees	100,000	232,000	232,000	303,000	50,000	353,000
Furniture	-	30,000	30,000	30,000	-	30,000
<u>TOTALS</u>	£1,900,000	2,440,000	2,530,000	2,921,800	179,440	3,101,240

11. Authority is requested for expenditure to be incurred on the Phase I buildings up to a limit of £3,101,240 inclusive of a contingency of £179,440.

D.W. FRY

Chairman
Mimrod Project Committee

5th February, 1960.

7 GeV PROTON SYNCHROTRONSummary of Estimated Cost, 30th November, 1959

1. The increases in the architect's estimate referred to in paper NI(GP)60.3 are:-

(a) Messrs. W.E. Chivers & Sons contractual claim for enhanced rates
CON/HAR/J3017

Agreement of enhanced rates for concrete, formwork, and reinforcement, for work carried out by the main civil contractor due to the considerable development in design, compared with the pre-contract information on which the tender documents were prepared. This applies to Job Nos. 900, 901, 902 and 911. £83,000

The Contractor represented that formwork, reinforcement and concrete required for the Magnet Room tunnels, shielding blocks and experimental area was so unlike that described in the Bills of Quantities that enhanced rates should be agreed to cover this work. It was conceded that the contractors' request for "Starred Rates" was a fair one, the principal points of his claim being:-

- i.) The contract drawings gave little indication of steel reinforcement involved, neither did they present a clear picture of construction difficulties.
 - ii.) The steel reinforcement involved was twice as great as that indicated in the Bills of Quantities. (The extra cost of this steel has already been approved at the rates in the original Bill of Quantities). This involved considerably more labour in cutting, bending, threading and lacing than could have been envisaged at the tender stage. Due to these difficulties much of the final bending of steel reinforcement was carried out in situ which is more costly.
 - iii.) The complex nature of the design required an unusual degree of accuracy, necessitating additional setting out, supervision and construction costs.
 - iv.) The insertion of drains, services, pipes, air vents, holding down bolts (of which little indication was given at tender stage) often to precise limits, interfered with construction generally and caused additional costs which could not have been anticipated.
 - v.) Because of the complexity of the design, the placing of concrete required unusual consideration and was more costly than could have been envisaged at tender stage.
 - vi.) The completion of the synchrotron within a reasonable time scale required that building work should proceed whilst the machine design progressed. As the machine design developed more detailed information was released and this has necessitated changes and additions to the building works.
- (b) Messrs. W.E. Chivers & Sons claim for increased preliminaries
CON/HAR/J3017

Contractual pro rata adjustment of the contractors tender provisions for preliminary items (Supervision, plant, temporary offices and stores, insurances, general overheads, transport of men etc.)

This applies to all Job Nos. relative to the main civil contract

£72,000

The Contractor is undoubtedly entitled to an increase in his lump sum preliminary items. The contract was let on the undertaking that "the sums in respect of preliminaries, camp, transport of men, and shift work would be adjusted if there was substantial variation in the extent of the work referred to in the "Bills of Quantities". The estimated value of measured work and daywork in the tender was approximately £600,000; the anticipated final cost of measured work and daywork is approximately £1,100,000, which proves a case for substantial variation.

The allowance for preliminaries on the original tender was approximately £106,000. The amount now allowed takes into account a possible reduction in the overall percentage for preliminaries because of an increased amount of work.

(c) Job No. 900

General under-estimation

£26,500

This is due to the very unusual nature of the building and its construction, the complexities of which are not always readily apparent when preparing estimates and which only come to light when the detailed final measurement is made. Since it is not possible to keep the measurement up to date with the construction, due to variations occurring during the course of construction, the pricing of the re-measured work is necessarily in arrears. The re-cutting, re-bending and provision of additional reinforcement is the principal item involved. This item has some of the same characteristics of the claim (a) above but must not be confused with it, the latter is an increase of labour rate for doing more difficult operations than the contract envisaged. The former is for doing extra work which has been necessary due to the unorthodox nature of the building and which has only become apparent when the working drawings are completed and when site modifications have been made to enable the civil and building work to be carried out on site.

(d) Job No. 904

Numerous minor modifications some of which are extras to meet criticisms of occupying department.

£3,000

(e) Job No. 905

Extra requirements for transformer pit and reinforcement.

£1,500

(f) Job No. 906

Extra requirements to Ripple filter choke foundation to comply with standing recommendations of the A.E.R.E. Fire Committee.

£2,000

(g) Job No. 911

Increase in double handling of shield blocks, this was to enable the testing of all lifting eyelets to be carried out to clients and Insurance Surveyors requirements.

£3,000

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|-----|---|--------|
| (h) | Minor modifications | £3,400 |
| (j) | Minor under-estimation on other job numbers | £3,000 |

2. The increase in the Engineers estimates referred to in paper NI(GP)60.3 are:-

- (a) An increase in the anticipated final expenditure under the Lighting and Small Power Contract apportioned as follows:-

	£	
Job No. 900	4,900	
901	5,000	
904	2,300	
905	<u>800</u>	
		£13,000

- (b) Job No. 900. Increased estimate for annular crane rails £1,150

- (c) An underestimate on the cost of the cooling circuits apportioned as follows:-

Heat Exchanger	Job No. 908	1,000	
Miscellaneous			
Pumps	908	2,400	
Revised Coolant System	912	<u>3,000</u>	
			£6,400
		<u>Total increase</u>	<u>£20,550</u>

There have however been some reductions in the estimates on account of

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|------|--|-------------|---------------|
| i) | Access tunnels only to be lighted | Job No. 902 | £500 |
| ii) | Omission of nozzles from the magnet ventilation system | Job No. 909 | £1,850 |
| iii) | Omission of circuits from laboratory No.5 | Job No. 926 | <u>£2,000</u> |
| | | | <u>£4,350</u> |

Thus leaving a net increase of £16,200

The reasons for the major increase are:-

- (a) It is clear that adequate allowance has not been made in earlier estimates for the cost of works which are carried out under the Electrical Contract for lighting and small power. The site modifications in the office and laboratory building (Job No. 904), which is now complete, have been re-estimated at £2,283. There is no doubt that comparable provision must be made in respect of the other major components of the project, therefore a sum of £4,900 has been included for the Magnet and Injector Room (Job No. 900), £5,000 for the experimental area (Job No. 901) and £800 for the Motor Alternator and Converter Rooms (Job No. 904).
- (b) The cost of the annular crane rails in the Magnet room (Job No. 900) is expected to be £1,150 more than had been estimated. The installation and setting of these rails to close tolerances on curved tracks, a task which has never been done before, has proved to be more difficult than was expected.

- (c) The cost of the main heat exchangers (Job No. 908) has increased by £955 due to the inclusion of two units in series in each circuit instead of a single heat exchanger.

The price obtained for the miscellaneous pumps (Job No. 908) on competitive tendering was £2,400 higher than estimated.

The cost of the cooling circuit in the Assembly and Test Building (Job No. 912) is expected to cost £3,000 more than was anticipated. The scheme as installed is more complex than was originally conceived, and included ultimately no less than three circulating pumps, two heat exchangers and an external water cooler. At the time it was felt that adequate funds were available but the final cost has turned out to be more than was expected, due to the urgency demanding that the work should be undertaken at day work rates.