

~~Use of the P.L.A. site~~
35/14

Use of the Rutherford Laboratory P.L.A. site for
a National Nuclear Structure Laboratory

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In this note we briefly examine some of the financial consequences of using the P.L.A. buildings and equipment as the basis for the construction of a National Nuclear Structure Laboratory along the lines already suggested by the working party. In particular a very preliminary survey suggests that it may be possible to reduce the total cost of the facility by approximately £1.5 Million, possibly more, if the P.L.A. area were used.

As the basis of the present discussion we have used the design and cost estimates quoted in the following documents:

- (i) Report of the working party on the proposed Daresbury nuclear structure laboratory. August 1967.
- (ii) Proposal for a large tandem generator. Professor K.W. Allen. April 1968.
- (iii) Report of the augmented working party on the possibility and costing of a British built Van de Graaff. May 1968.

It should be emphasised that the present study of costs is very preliminary and should mainly be considered as an indication of whether it is worthwhile for the suggestion to be considered in more detail.

Buildings

The present P.L.A. machine area, shown on the attached plan, consists of two experimental areas of 3,000 sq. ft. and 4,400 sq. ft. respectively, a linear accelerator area of 2,500 sq. ft., an ancillary equipment area (klystron hall) of 3,000 sq. ft. and a high voltage injector room of 1,900 sq. ft. Adjacent is sufficient laboratory, office, stores and workshop space for about 100 people.

To house the new Van de Graaff machine it would be necessary to build a new

accelerator tower: some possible schemes for this are shown on the attached drawing R.L.A./MISC/1478B. In the siting of this tower it has been assumed that all the existing P.L.A. beam lines will be used in their present position. This may not be the best arrangement but it provides a convenient basis for costing purposes. As two of the present P.L.A. office buildings are dilapidated and should be scrapped a new 2 storey block providing 12,500 sq. ft. of accommodation is envisaged. The £100,000 allocated for this would also include the provision of air conditioning plant for the computer installation which however need not necessarily be located in the new building. It is anticipated that apart from the accelerator tower and new building already mentioned no other new buildings would be required.

A suggested tower scheme is shown on RLA/MISC/1478/B, as scheme 1. Two other possibilities (Schemes 2 and 2a) have had brief consideration: but they involve technical points, and do not greatly affect the main issue. A summary of expected costs are shown in Column B of Table I, Column A ~~on Table B of Appendix 1, Table B~~ being the original Working Party proposals for comparison. The conclusion is that using as much as possible of the P.L.A. site, a real saving (i.e. not a pruning exercise) of £1.3M is possible.

Equipment

The PLA is equipped with at least 6 experimental cells,¹⁰ beam lines, magnets etc. for 50 MeV proton working: the value of the existing installed plant is £.3M. (See Table 2).

The point has frequently been made that this could all be shipped to Daresbury. Costs of installation, however, are not negligible: moving the A.W.R.E. multigap to A.E.R.E. cost £50K, while the cost of nuclear cabling at Oxford (not included in this discussion) was £35K in 1964.

If advantage is to be taken of this situation, a decision cannot be indefinitely postponed, since the experimental areas have been scrutinized by the Accommodation Committee for a long time, and alternative use spoken for.

Personnel

In the original report on the possible closure of the P.L.A., residual numbers of 16 - 22 for continued work in nuclear structure physics was foreshadowed. If we

assume that 15 of these places could be allocated to the national tandem, for 5 years, then 75 man years could be made available to the project within the existing framework.

Conclusion

If the national tandem were sited at R.H.E.L. on a minimum basis, i.e. use of the existing target rooms and equipment and the availability of some personnel, the actual saving is of the order of £2M.

TABLE I

Proposed Nuclear Structure Laboratory

Comparison of costs of various schemes. The details of the four schemes set out below are as follows.

Table A Is the Daresbury proposal.

Table B A scheme using the existing PLA buildings with a new tower building alongside housing a vertical accelerator with a steel pressure vessel. This is shown as Scheme 1 on drawing

Table C As table B but combining the steel pressure vessel with the concrete tower in the form of a post-tensioned concrete pressure vessel. This is shown as Scheme 2 on drawing

Table D As table C but with a modified arrangement of ribs on the pressure vessel. (Two parallel ribs in place of four radial ribs). Scheme 2a.

All the figures below are £1,000 s.

1. <u>Building</u>	A	B	C	D
Accelerator Bldg. } Target Bldg. }	800	205 Existing	350 Existing	230 Existing
Lab. and office bldg. Computer bldg, }	250 65	100	100	100
W/S and assy. bldg.	65	Existing	Existing	Existing
Boiler House } Plant Room }	50	Not required Existing	Not required Existing	Not required Existing
Electric supply	10	Existing	Existing	Existing
	<hr/>	<hr/>	<hr/>	<hr/>
17% Fees	1,240 211	305 52	450 77	330 56
15% Contingency	1,451 200	357 54	527 79	386 58
Total	£ 1,651	£ 411	£ 606	£ 444
	<hr/>	<hr/>	<hr/>	<hr/>
2. <u>Accelerator</u>				
Cost of machine	878	878	778	778
Contingency	100	100	89	89
Design and drawing	120	50	50	50
Factory pre-assembly	30	-	-	-
	<hr/>	<hr/>	<hr/>	<hr/>
Total	£ 1,128	£ 1,028	£ 917	£ 917
	<hr/>	<hr/>	<hr/>	<hr/>
<u>GRAND TOTALS</u>	<u>£ 2,779</u>	<u>£ 1,439</u>	<u>£ 1,523</u>	<u>£ 1,361</u>

TABLE 2

P.L.A. Experimental Area Equipment

The table below shows an estimate of the cost of fitting out the P.L.A. experimental areas.

Beam line apparatus	£ 160,000
TV Installation	5,000
Cables and services	30,000
Concrete and C.I. shielding	42,000
N ₂ Magnet complex	80,000
<u>Total</u>	<u>£ 317,000</u>