LS-37
November 10, 1985
G. K. Shenoy
G. S. Knapp

LENGTH OF BEAMLINES AND WIDTH OF THE EXPERIMENTAL HALL AT A 6-GeV SYNCHROTRON FACILITY

The width of the experimental hall at a 6-GeV facility is closely related to the length of the beamlines. This note addresses this aspect in some detail.

In general, no two beamlines will have identical lengths or the placement of various optical elements. Hence fixing the beamline lengths prior to their assignment to specific experiments is difficult. In spite of this fact, a few general conclusions are made.

1. At least 25m of all the beamlines will be behind the shielding wall. Within this length many beamline components can be accommodated as shown in Fig. 1.

2. For most beamlines on bending magnets (BM), the first optical element will be at 30m. For a 3:1 aspect ratio for the optics, the hutch will be at about 40-50m. This will cover most of the general applications like absorption spectroscopy, diffraction, etc.

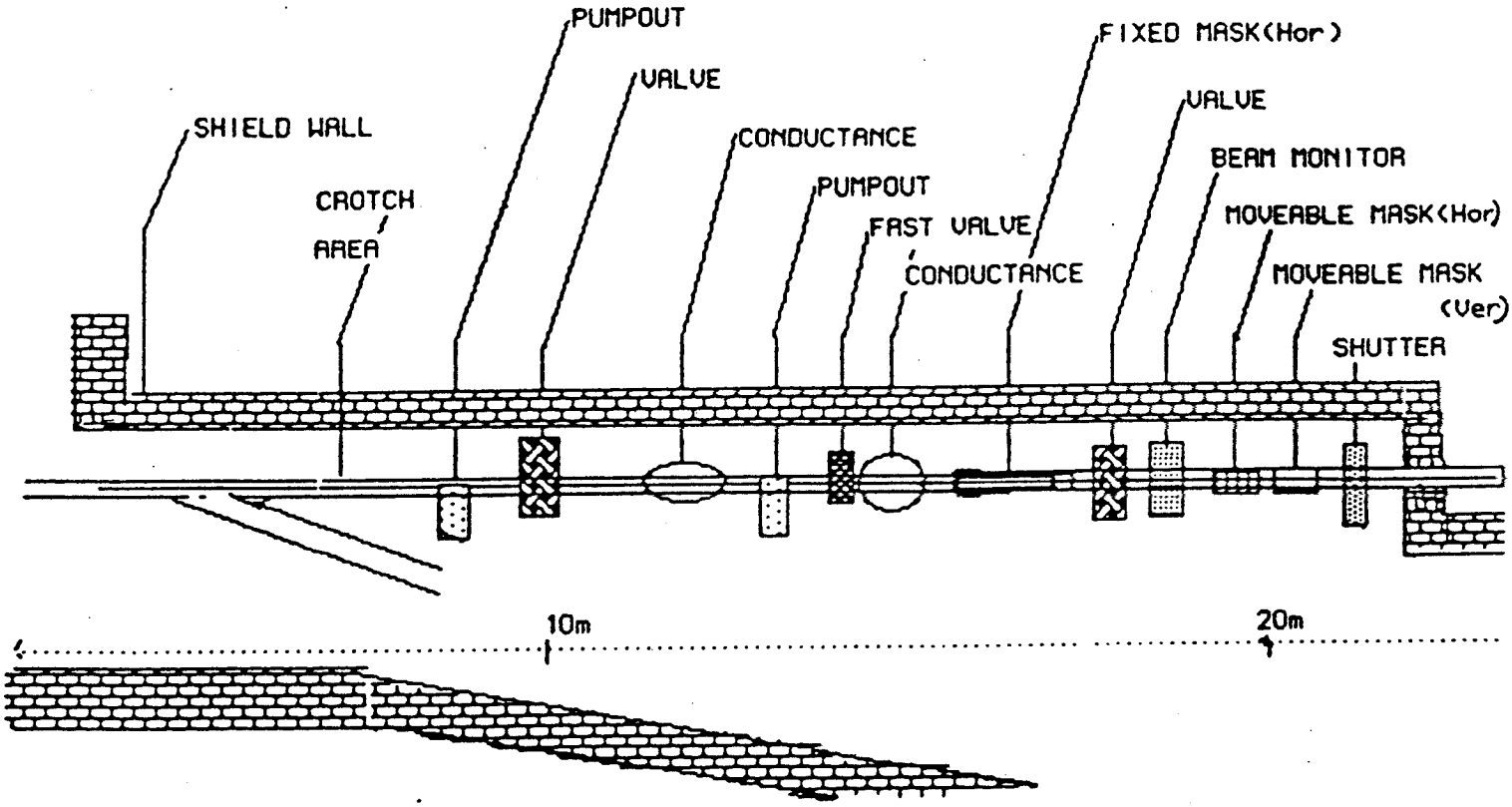
3. The undulator beamlines will have to be somewhat longer with the experimental hutch located at about 70-80m for most investigations. A beamline layout consistent with this idea is shown in Fig. 2. This demands the width of the hall to be about 32m measured from the beamline to the ring road.

4. On the other hand, for the experiment on undulator and wiggler lines demanding higher resolution the hutch will be at 90-100m. This situation is shown in Fig. 3 and the width of the hall is now about 40m. This hall provides more room for instrumentation and staging area. More importantly, one can easily accommodate tandem experimental stations on undulator beamlines as shown.

5. Placing hutches on undulator beamlines nearer than 70m (see Fig. 3) brings considerable difficulties with regard to experimental and instrumentation space. Thus the 32m scheme presented in Fig. 2 should be considered the minimum need from the user view point.

6. Increasing the width to 40m permits tandem stations on undulator beamlines, nearly doubling the total scientific involvement of the users and more efficient utilization of the facility. The increase in the cost of the facility hall due to increase in width of the experimental hall by 8m is hence justified. This increase in cost is estimated to be about 10M$.

7. It is interesting to evaluate a working synchrotron facility. We present in Fig. 4 an approximate sketch of NSLS x-ray ring. This ring is considerably smaller than the 6-GeV facility. In spite of this, the hall width of 20m is inadequate and is absolutely crowded by instrumentation and beamlines. If the reader of this note is not familiar with NSLS, the attached letter (Exhibit I) of August 30, 1985 from Janos Kirz, Chairman of the User's Executive Committee to Mike Knotek, Chairman of NSLS describes the users' viewpoint very well.



TYPICAL BEAMLINE COMPONENTS

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9700 South Cass Avenue, Argonne, IL 60439 312/972-5537

Fig. 1

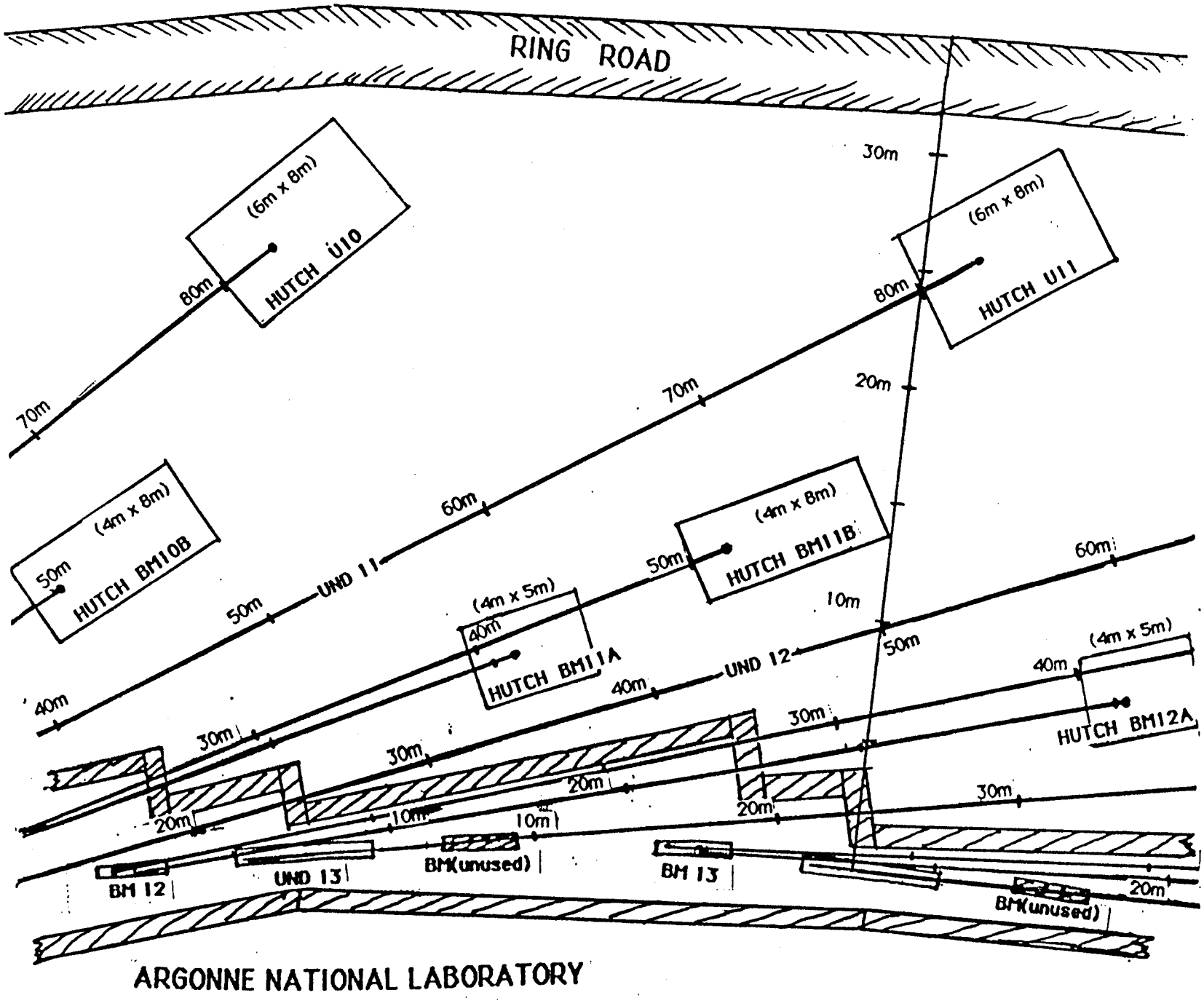
RING ROAD
(6m x 8m)
HUTCH U10
80m
70m
(4m x 8m)
HUTCH BM10B
50m
UND 11
60m
70m
30m
(6m x 8m)
HUTCH U11
80m
20m
(4m x 8m)
HUTCH BM11B
50m
10m
60m
(4m x 5m)
40m
HUTCH BM11A
40m
UND 12
50m
(4m x 5m)
40m
HUTCH BM12A
30m
30m
30m
30m
20m
20m
20m
10m
10m
BM 12
UND 13
BM(unused)
BM 13
BM(unused)
20m
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Fig. 2

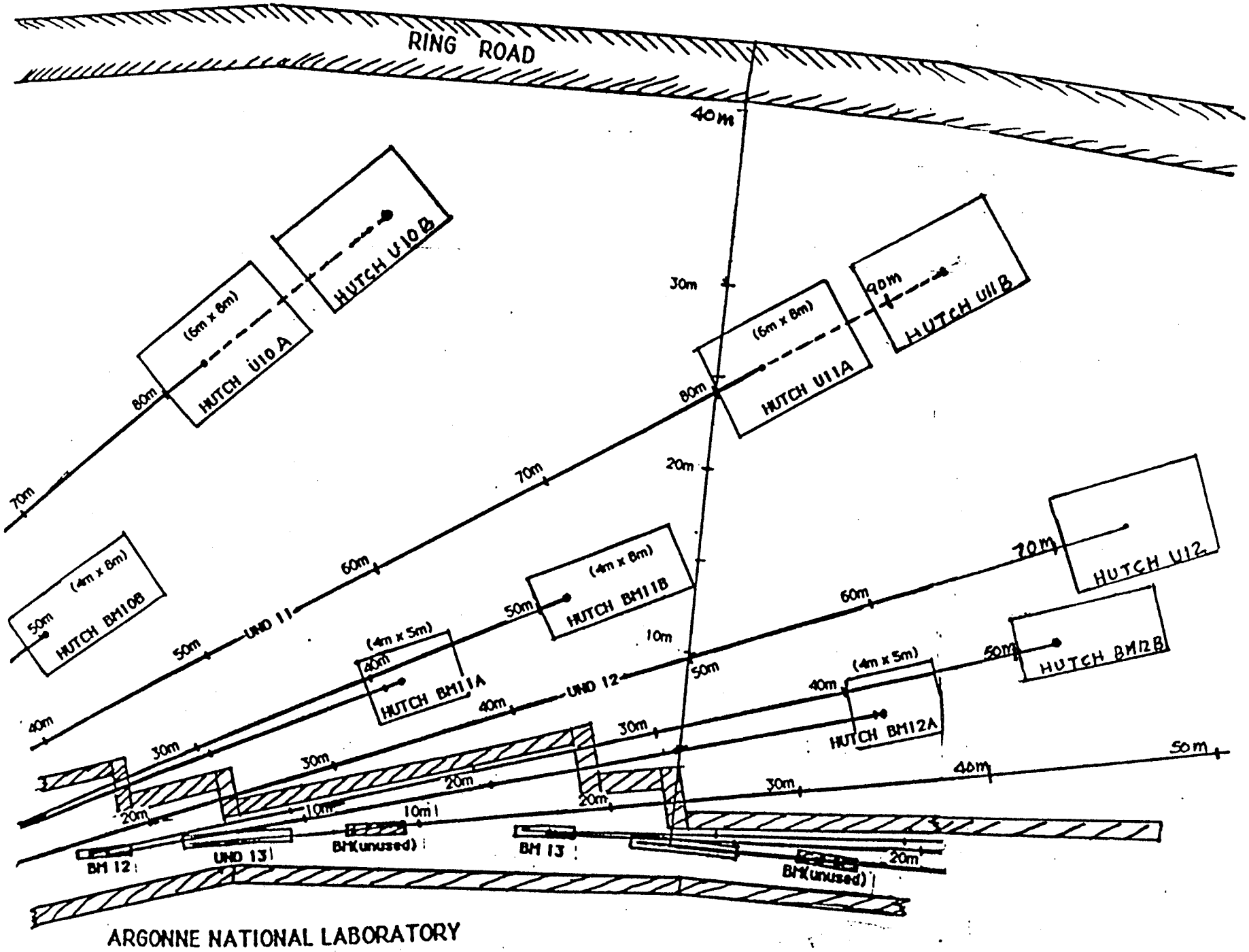
RING ROAD
40m
30m
20m
10m
HUTCH U10B
(6m x 8m)
HUTCH U10A
80m
70m
(6m x 8m)
HUTCH U11A
90m
HUTCH U11B
80m
70m
60m
(4m x 8m)
HUTCH BM10B
50m
UND 11
50m
(4m x 8m)
HUTCH BM11B
(4m x 5m)
40m
HUTCH BM11A
40m
UND 12
50m
60m
70m
HUTCH U12
50m
HUTCH BM12B
(4m x 5m)
40m
HUTCH BM12A
40m
30m
30m
30m
30m
20m
20m
20m
20m
10m
10m
50m
BM 12
UND 13
BM(unused)
BM 13
BM(unused)
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Fig. 3

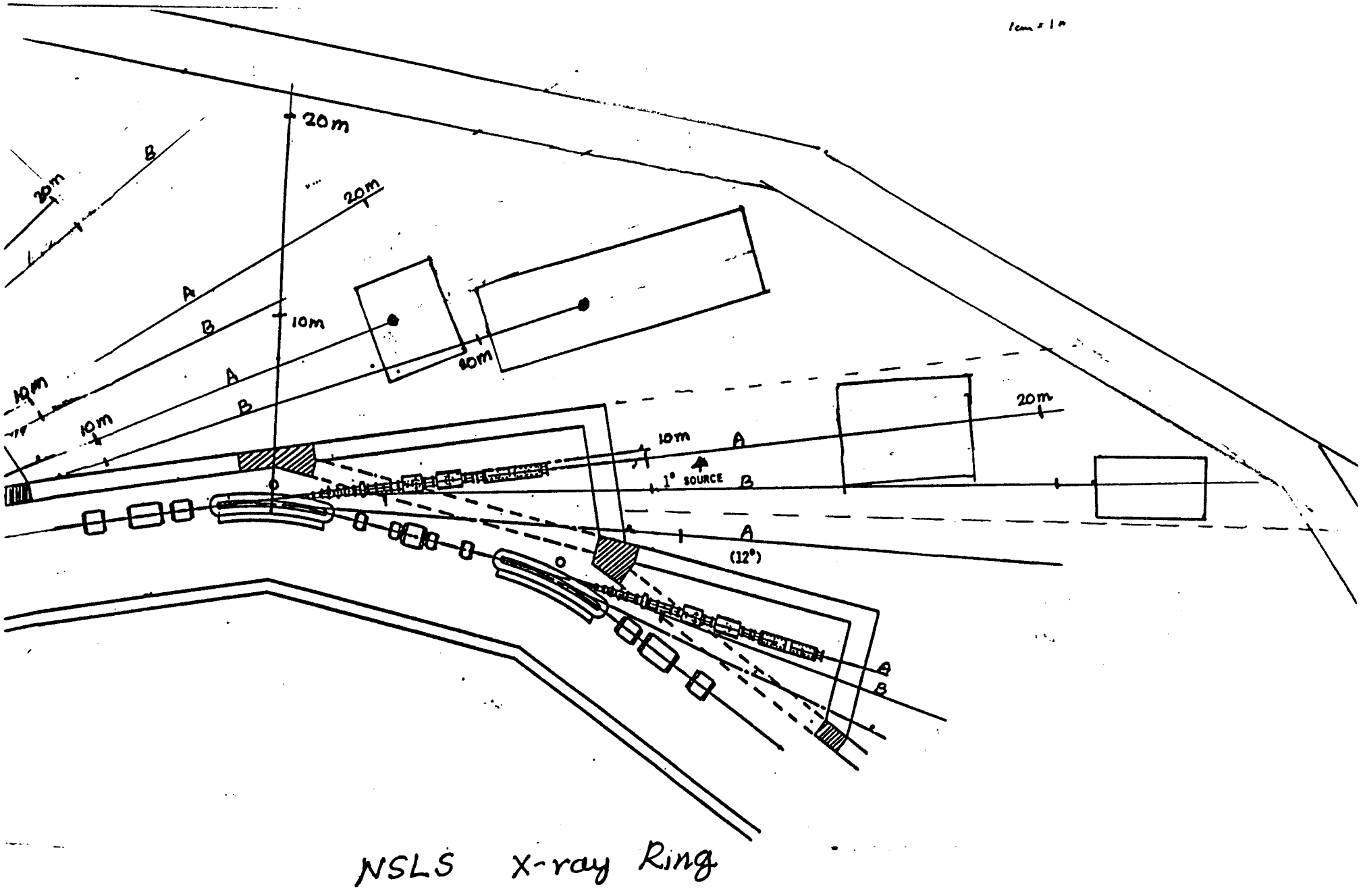
1cm = 1m
20m
20m
20m
10m
10m
10m
10m
10m
20m
A
B
A
B
A
B
A
B
A
B
1° SOURCE
(12°)
NSLS X-ray Ring

Fig. 4

EXHIBIT I

High-Energy Group
Department of Physics
State University of New York at Stony Brook
Stony Brook, New York 11794-3800
telephone: (516) 246-6105

StonyBrook

August 30, 1985

Dr. Michael Knotek
Chairman
National Synchrotron Light Source
Brookhaven National Laboratory
Upton, NY 11973

Dear Mike,

During the past several months the Light Source has moved into a new era. Now users can and do count on regular scheduled operations on both rings. Energy, current, brightness and lifetime are all such that high quality research can be done, and we are counting on the success of planned further improvements in several of these parameters.

As the news of this situation spreads in the community, a problem that has been with us already for awhile, is growing into what I see as a major obstacle to work at the NSLS. The problem is lack of space, and it has several facets. They all stem from one common source: more and more users are showing up to use the facility.

The most serious aspects of the problem are the following:

1) Office Space Each beamline needs a core of resident staff, and these individuals need offices. Members of PRT-s and general users who are not permanent residents on site need desks to sit at. A quick estimate of the numbers involved indicates that the problem is very serious now, and will become staggering shortly.

2) Housing On-site housing is already overloaded, especially during the summer. As more general users arrive, and as PRT-s attract more team members to come to work on the floor, the housing crunch is becoming the housing crisis! There is no suitable facility off-site to accommodate the need, and proximity of housing is of particular importance for a facility that runs around the clock.

3) Set-up and Storage As we move into a routine operational phase, with experiments cycling on and off most beamlines, set-up and storage space has become unavailable. The floor is unbelievably crowded, and is becoming more so. Phase II will bring some temporary relief, but the growth of the need outstrips the growth of available space by a large factor.

The Executive Committee of the Users Organization considers these problems very serious, and urges you to make every effort to generate some form of relief. If we can play a constructive role in this area, please let us know.

Sincerely yours,

Janos

Janos Kirz
Chairman
User's Executive Committee

JK/acd