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50-77

June 2 , 1995

James H. Joyner, Chief
Facilities Radiological Safety
and Safeguards Branch
Division of Radiation Safety
and Safeguards
USNRC Region I
475 Allendale Road
King of Prussia, PA 19406

SUBJECT: Reply to Request for Additional Information Regarding Final Status Survey Report
Reference (1) Letter, D. Luster CUA to T. Dragon - NRC dated 12-20-94
Reference (2) Letter, J. Joyner-NRC to D. Luster-CUA dated 2-3-95

Dear Mr. Joyner,

This letter transmits our reply to the reference (2) letter which requested additional information regarding the reference (1) Final Status Survey Report. This letter also contains, as Attachment 1 to question 2, a final status survey plan for an area currently identified as Power Plant-Machine Shop which is submitted for NRC review and approval.

Should you have any questions or require additional information, please contact me.

Sincerely,

Donald R. Luster

Donald R. Luster
Radiation Saffety Officer and
Reactor Administrator

cc: Joseph Beres, Director Environmental Health and Safety
Sister Rosemary Donley, S.C., Executive Vice President
Dr. John Gilheany, Chairman, Mechanical Engineering

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1. All radioactive materials, including waste materials, have been removed from the reactor room.

   Reactor components, which were removed during the defueling process and stored in the reactor room were surveyed and released as metal scrap in accordance with Regulatory Guide 1.86 release criteria.

   Suspect radioactive waste has been bagged, placed in a DOT Spec 1A2 package, and is currently stored in CUA's on site low level rad waste storage facility.

2. The reactor was originally located in the Power Plant building on campus from 11-15-57 to 1-10-61. File correspondence confirms that the reactor was moved to the Pangborn Engineering building on 1-10-61. As of this writing, we have not been able to locate copies of the documentation requested.

   In order to provide up to date documentation, CUA is proposing for NRC review and approval, a supplemental final status survey plan for the area in the Power Plant building that originally housed the reactor. This plan is Attachment 1 to this letter. Upon approval, the plan will be implemented and CUA will submit a supplemental report on the radiation survey it has performed to confirm that radiation and surface contaminating levels in the original reactor location, Power Plant building, satisfy the values specified in the Decommissioning Plan and in the Commission's guidelines document. The supplement report will be submitted as a new Appendix C to a revised Final Status Survey Report reflecting this change and the other changes discussed in this letter.

3. The reactor console and other component parts were surveyed for fixed and removable contamination and were found to meet the Reg. Guide 1.86 release requirements. Items were released as unrestricted scrap.

4. The reactor console was removed from the reactor room prior to the final survey. The purpose of Figure 4, provided in section 2.2, Facility Description, was to locate the Reactor Room in relation to surrounding areas.

5. These statements are based on:

(a) the recollections of the previously employed RSO and HP technician (personal communications)

(b) the review of available survey records from the 10/65 to 1/82 time period for the reactor room Pangborn Building location.

(c) the review of available CUA/AEC-NRC reactor correspondence files.

These files and records are currently stored in the RSO office, Pangborn Hall, Room B18A.

6. NUREG/CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination," infers that background levels are determined by multiple measurements and averaged. Also, when reviewing final survey data from a uranium fuel fabrication plant decommissioning, the NRC approved methodology was to determine an average background level for unaffected areas of similar construction and size for evaluation against the average affected area background and the 5 micro R guideline parameter.

The discrepancy, in this case, will not affect the final conclusion that the 5 micro R above background guideline has not been exceeded.

7. Re: Section 5.3.1 Fixed Beta/Gamma Measurements
Section 5.3.3 Fixed Alpha Measurements

Probe/Meter Combination	Correction Factor
Ludlum Model 44-9/Ludlum Model 2221	$DPM/100_{cm}^2 = {}^{Net}CPM \times 34$
Ludlum Model 43-65/Ludlum Model 2221	$DPM/100_{cm}^2 = {}^{Net}CPM \times 7$

The correction factor was determined by taking the net CPM and correcting for 4 pi efficiency* and the active area of the detector.

*using a Tc 99 electroplated disk standard-approx 2 inches in diameter for beta and using a 50_{cm}^2 Am 241 standard for alpha.

8. This range was determined in the scaler mode.
The geometry used corrects to 4 PI activity.
The radionuclide used in the calibration is Tc 99.
Minimum detectable activity is determined by:

$$MDA = \frac{2.71 + 4.65 \sqrt{Bk\ (1min.\ Count)}}{1 \times E \times A/100}$$

where
E = detector efficiency
A = active probe area

9. Section 6.3, page 8 (unnumbered)
Section 6.3 has been rewritten to address the NRC comments and a new 6.3 will read as follows. Also, figures 5 and 6 will be withdrawn.

> 6.3 Comparison of Final Status Survey Results to Compliance Criteria
> The survey data in Appendix A and Appendix B verify that final residual surface contamination and external radiation levels measured at 1 meter from surfaces meet the acceptable compliance criteria as specified in the approved decommissioning plan and the NRC guideline document titled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By product, Source, or Special Nuclear Material.

10. The grid system used for data reporting followed the guidance of NUREG/CR-5849 and is correct. The "J" which appears on the grid map should be ignored. In the interim please make a "pen and ink" change by crossing out the J. We will submit a revised map.

11. The alpha standard in use to calibrate the Tennelec Model 5100, is a Pu 239 source electroplated onto a two inch diameter stainless steel disk.

The beta standard in use to calibrate the Tennelec Model 5100 is a Tc 99 source electroplated onto a two inch diameter stainless steel disc. Alpha background averages 0.4 dpm; beta background averages 0.6 dpm.

For small items such as gas lines and door ledges, wipes were taken over an area of approximately $100_{cm}{}^{2}$ (1" X 16")

12. Direct alpha and beta/gamma surveys were taken using a Ludlum 2221 Scaler/Ratemeter in the scaler mode for one minute. The Ludlum Model 43-65 alpha scintillator was calibrated using an Amersham Am-241 wide area reference source with the Am 241 incorporated into the surface of an anodized aluminum foil of 0.3 mm thickness.

Calibration was performed in the same manner as described in the item 8 reply, using the same calibration standards.

13. A general room survey was performed at contact using both alpha scintillation and pancake probes. No localized elevated areas were identified.

14. The air conditioner identified in this Table of Upper Surfaces was window frame mounted and exhausted directly outside; no exhaust dustwork was associated with the unit. The unit, which was in the reactor room at the time of the report submittal, has since been removed from the room and placed in the on site low level rad waste storage facility. The window has been renewed.

15. In the reply to question 9, it was stated that Figure 6 will be withdrawn since the survey data provided in Appendix A and B is appropriate. Therefore this question is no longer germane.

Attachment 1

FINAL STATUS SURVEY PLAN: POWER PLANT MACHINE SHOP

1.0 Discussion

The approximate 24 ft. x 58 ft. rectangular room which originally housed the reactor was slightly modified in 1961 by the construction of an internal floor-to-ceiling cement block wall which partitioned off a triangular area used to house new boiler equipment. (See Figure C-1 and C-2.) The remainder of the room was converted into a machine shop and continues to function in this capacity.

The machine shop area is occupied and in continuous use with an assortment of general machine shop equipment in place (lathes, drill presses, milling machines, belt sanders, grinders, table saw). The Power Plant mechanical room contains equipment associated with the power plant.

2.0 Survey Design

The physical presence of equipment on the floor in the machine shop and power plant mechanical room, coupled with the continuing use and occupancy of these areas will necessitate a modification in survey design.

A survey built around the premise that...if there was a problem that released radioactive contamination into the room, what would still be there?...will be conducted as follows:

The room will be gridded, on a map only (Figures C-3 and C-4), into one meter square block. The "points" formed by the intersecting lines will be used as survey point locations as follows:

- Direct Radiation Surveys

  At least thirty measurements of low level radiation fields will be taken at selected grid points at a distance of one meter from the floor surfaces. Residual radioactivity will be considered acceptable based on the criteria stated in the approved decommissioning plan.

- Indirect Contamination Surveys

  At least thirty wipe measurements of 100 cm2 (nominal) will be taken on elevated horizontal surfaces within the rooms. Locations will be referenced to the floor grid map, Figures C-3 and C-4. At least thirty wipe measurements will be taken on the lower surfaces (floors and walls up to two meters.)

- Direct Contamination Surveys

  At least thirty one-minute readings will be taken for fixed beta/gamma contamination levels at selected floor grid points. Locations will be referenced to the floor grid maps.

  Residual radioactivity for direct and indirect contamination surveys will be considered acceptable based on criteria stated in the approved decommissioning plan.

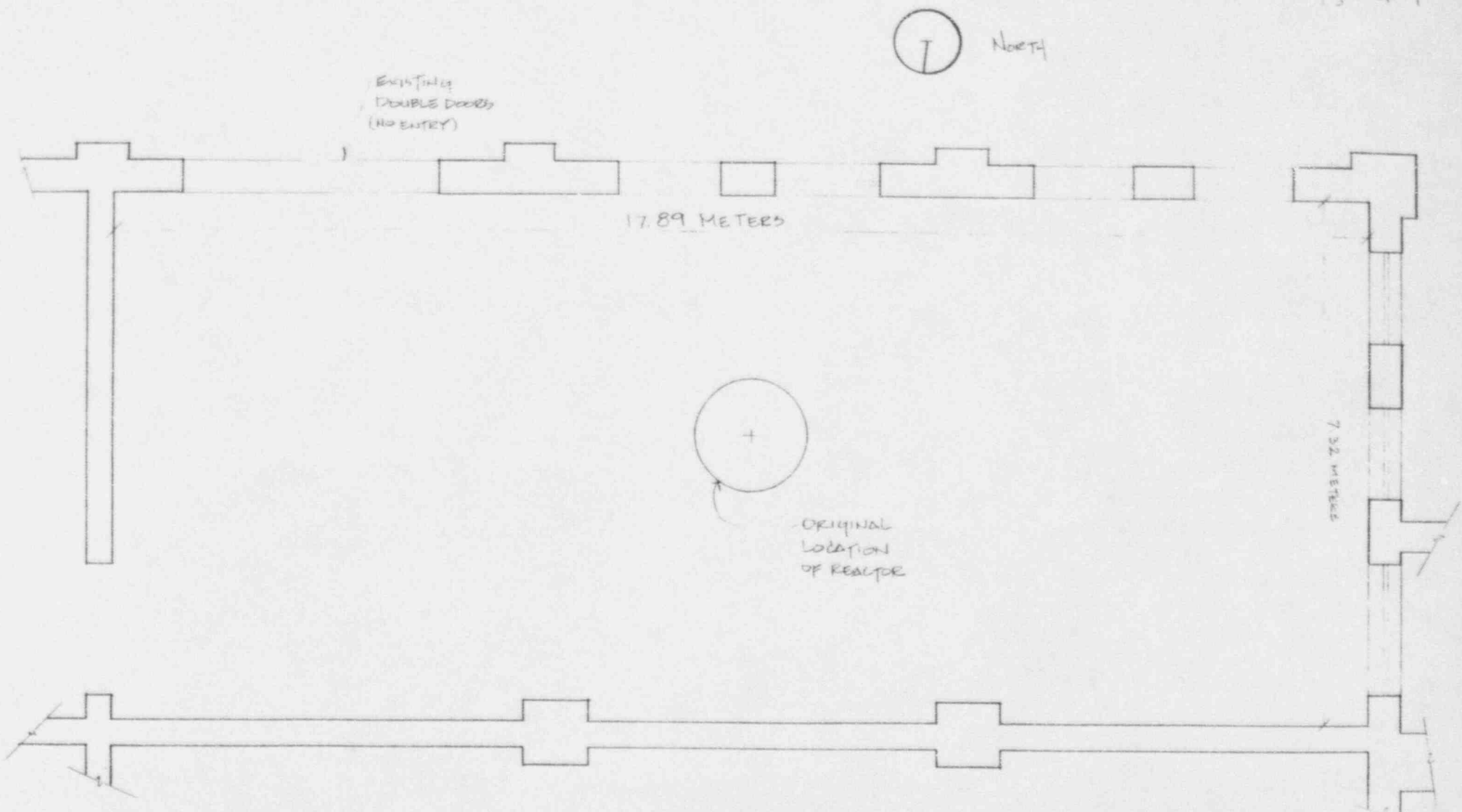


FIGURE C-1 REACTOR ROOM PLAN (1957 - 1960)

(ORIGINAL LOCATION)

SCALE 1:50 (METERS)

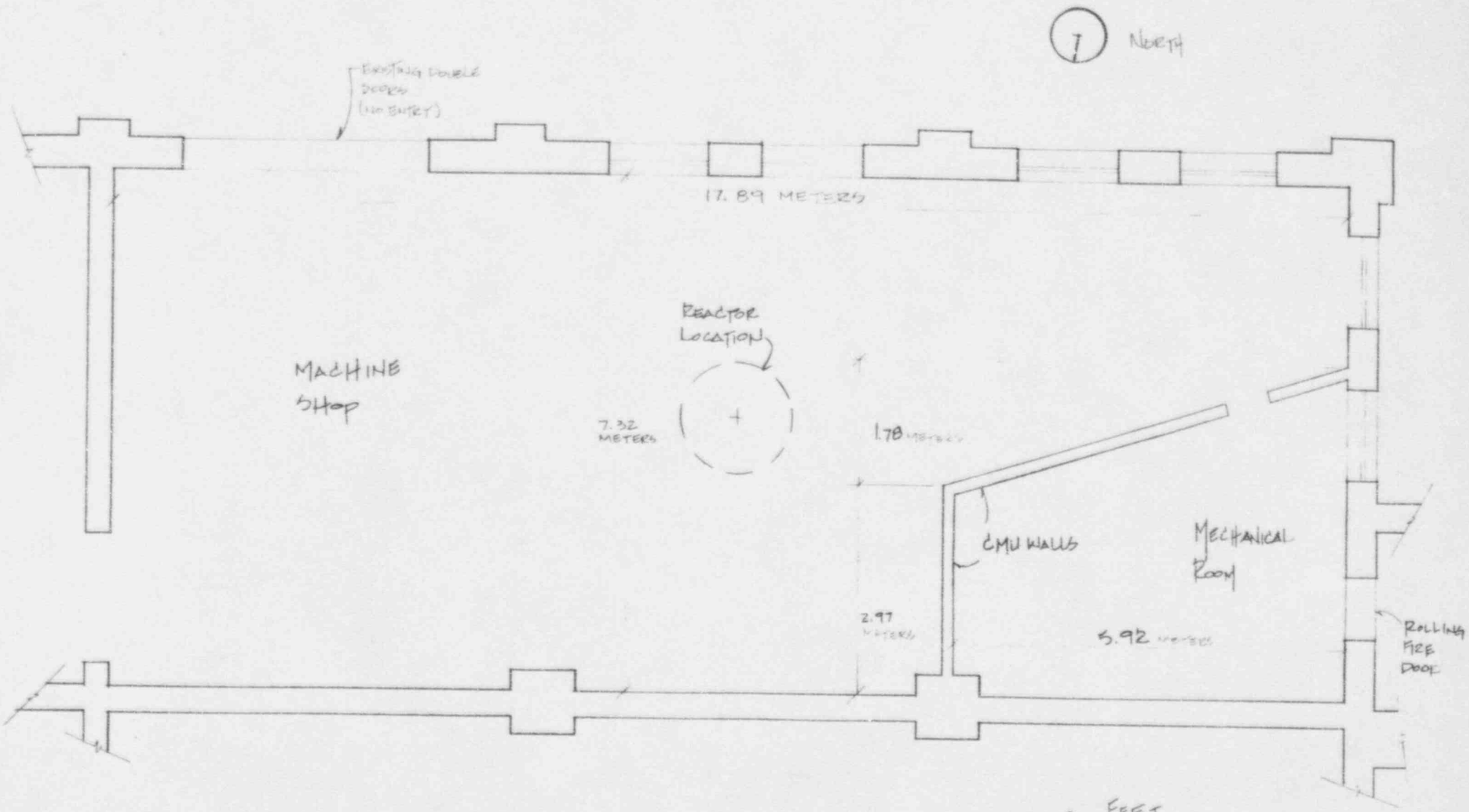
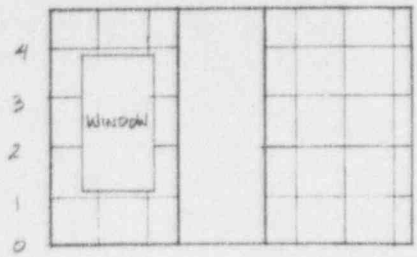


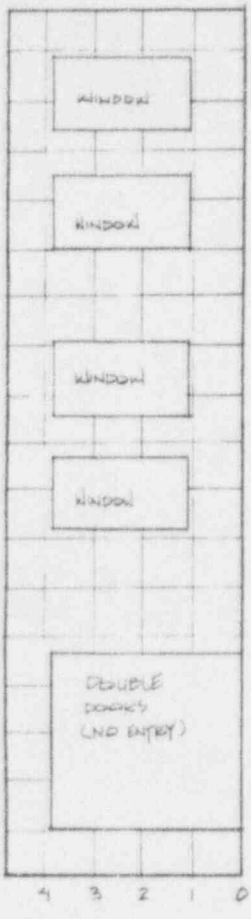
FIGURE C-2 **MACHINE SHOP - (same as Figure c-1)**

(showing interior partitions which created the Power Plant Mechical Rm.

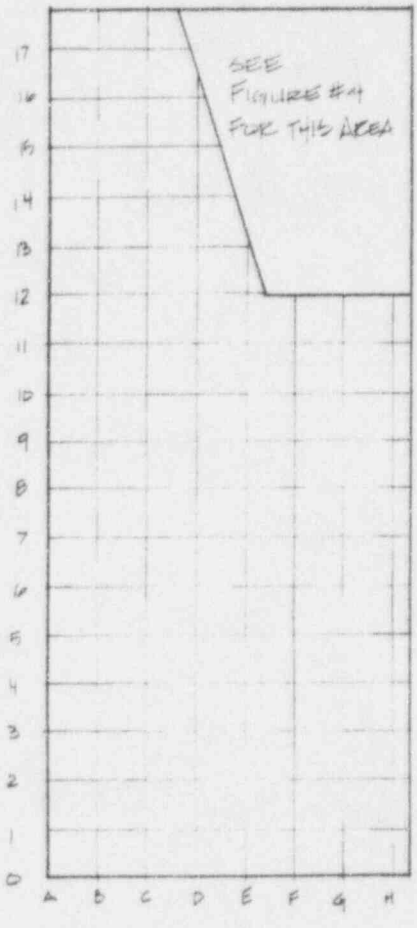
Pg 3 of 4



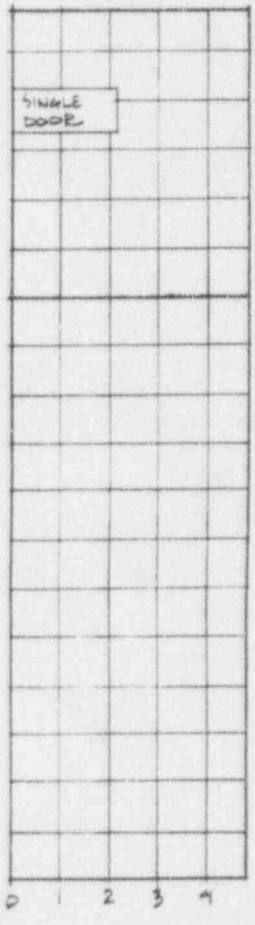
WEST WALL



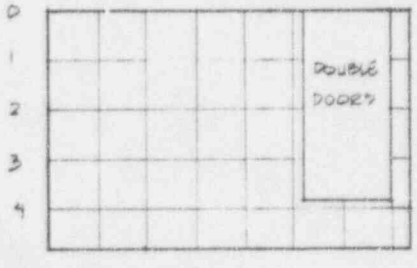
SOUTH WALL



FLOOR



NORTH WALL

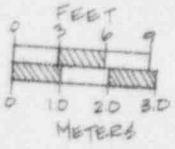


EAST WALL

NORTH

FIGURE C-3 POWER PLANT - MACHINE SHOP

one meter square grid



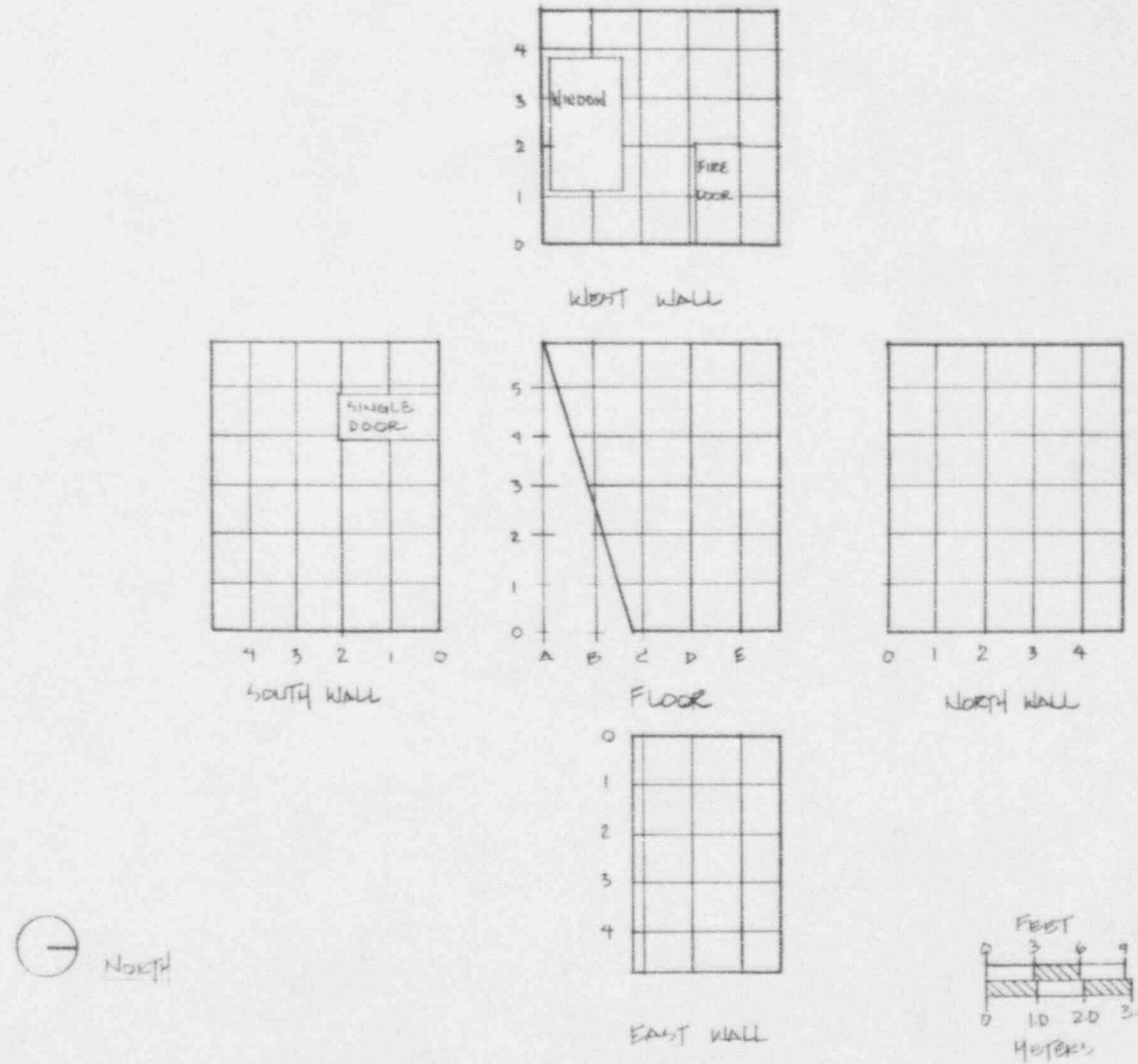


FIGURE C-4 POWER PLANT - MECHANICAL ROOM

one meter square grid

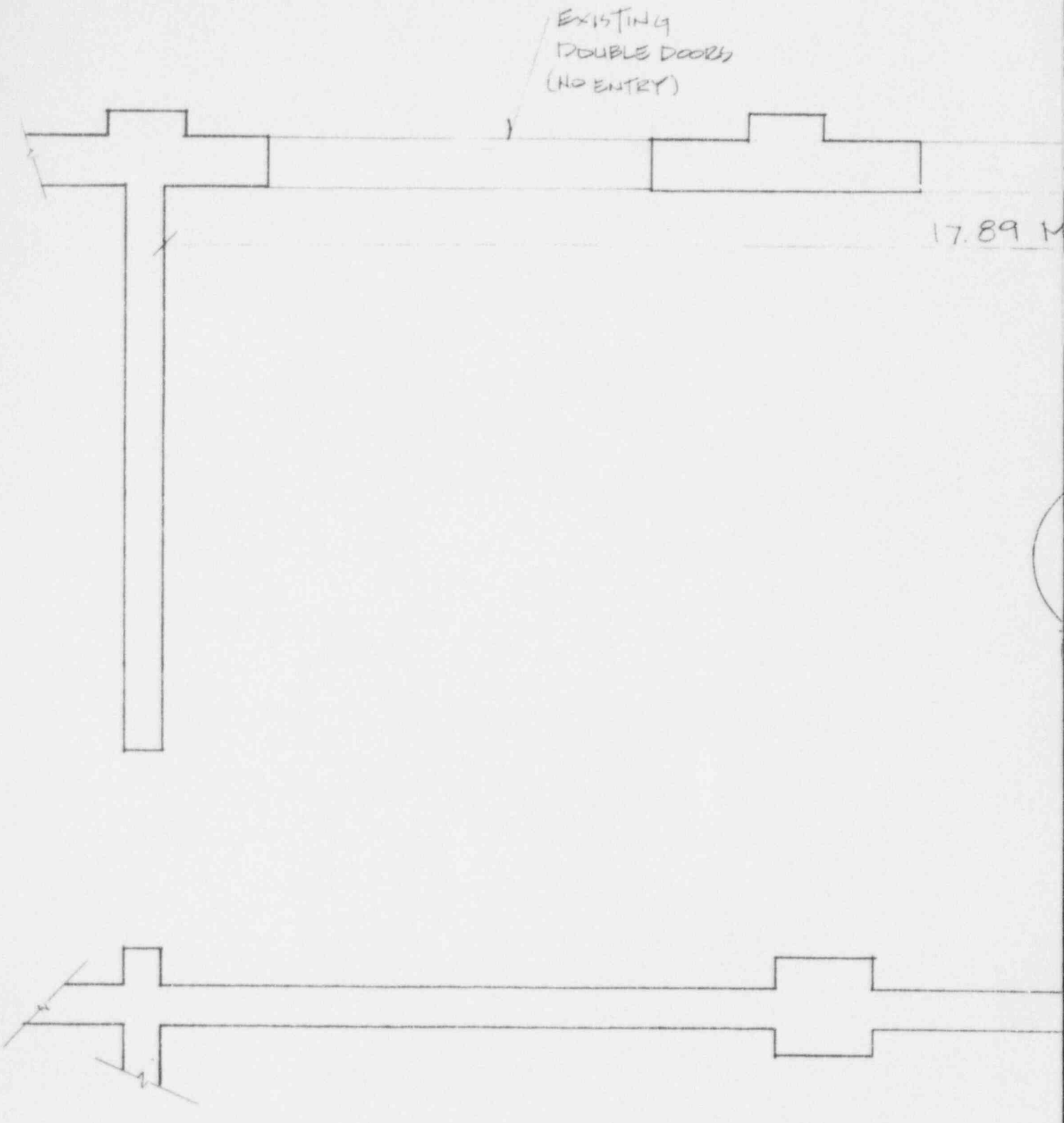
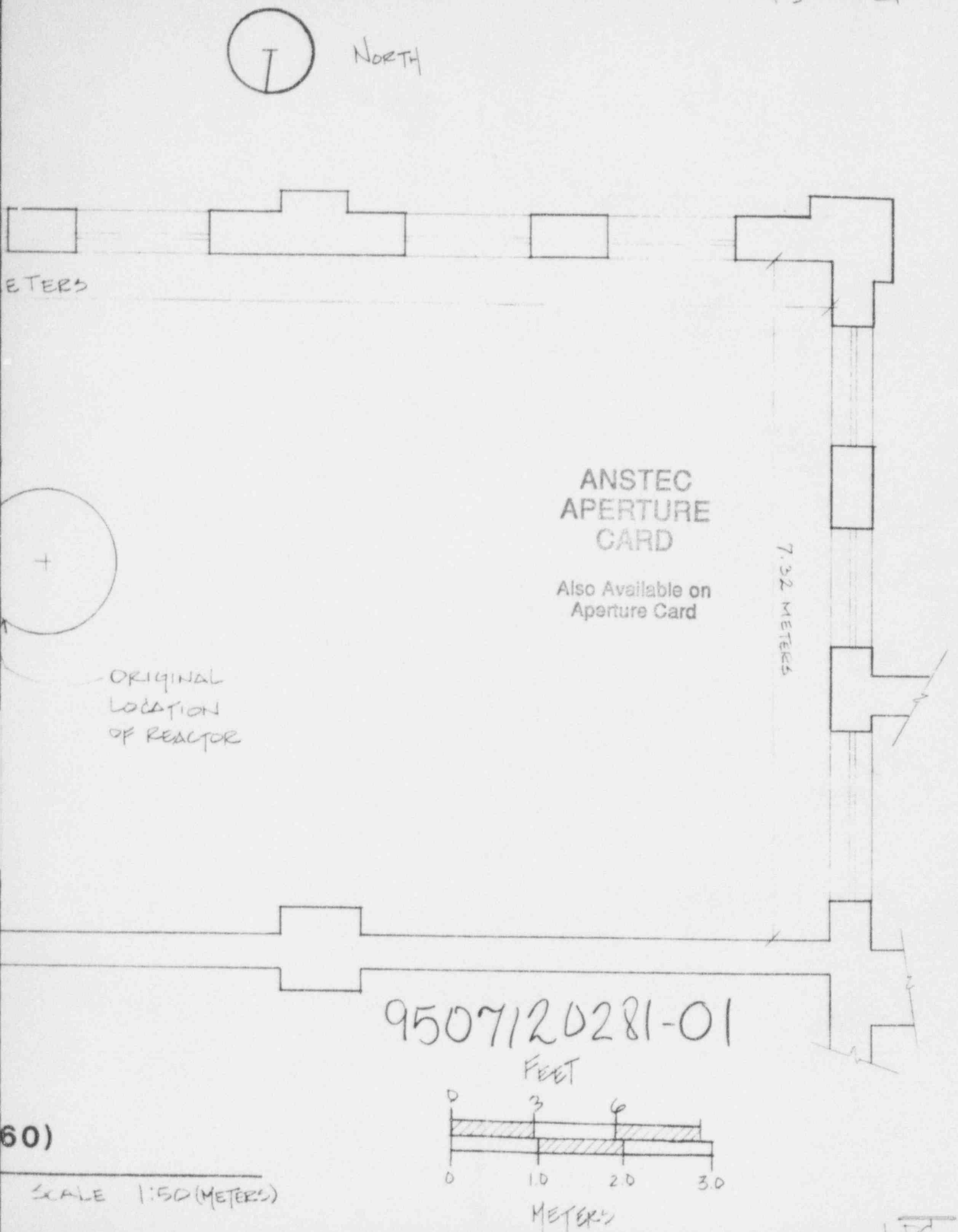


FIGURE C-1 REACTOR ROOM PLAN (1957 - 19

(ORIGINAL LOCATION)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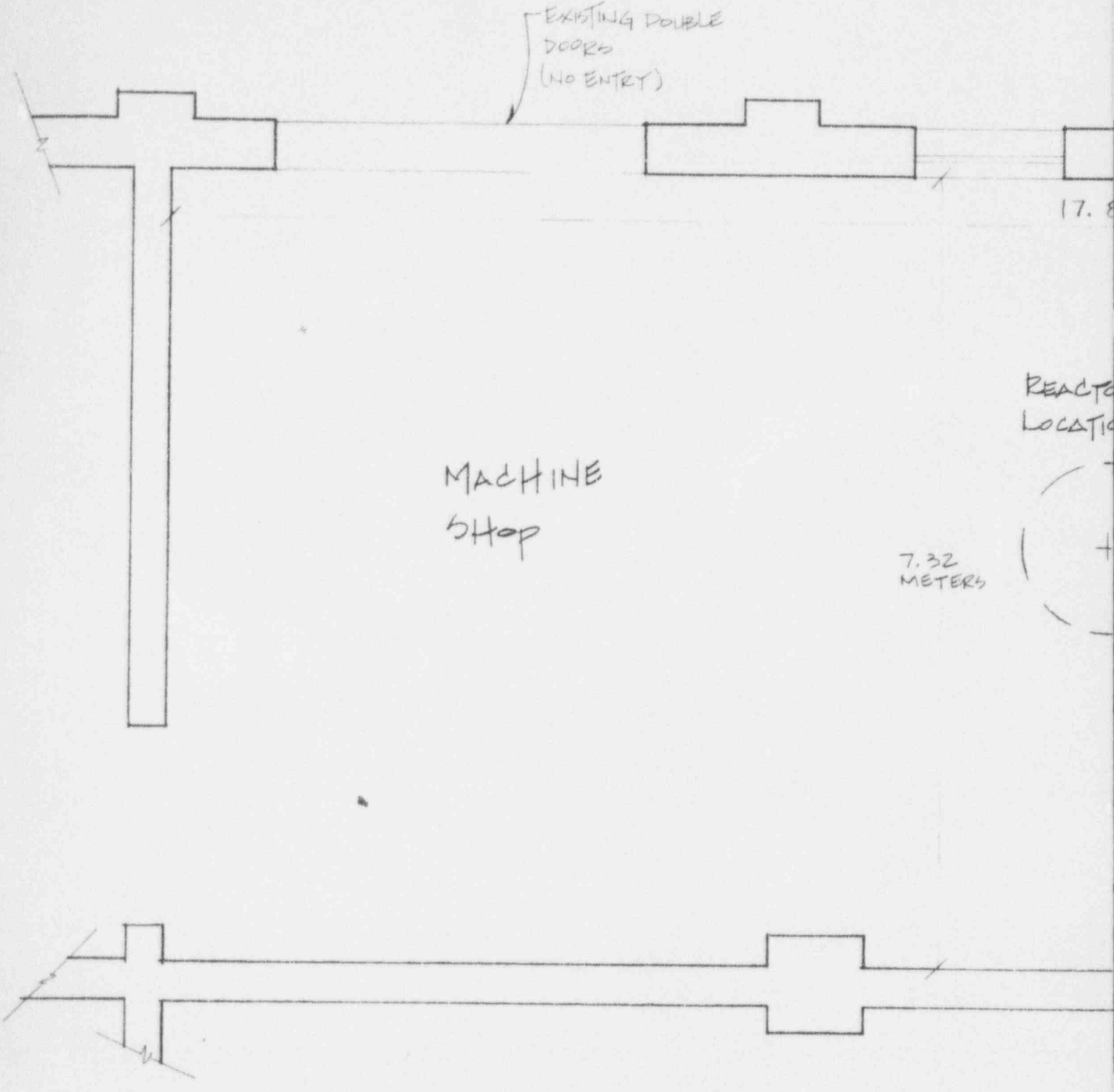
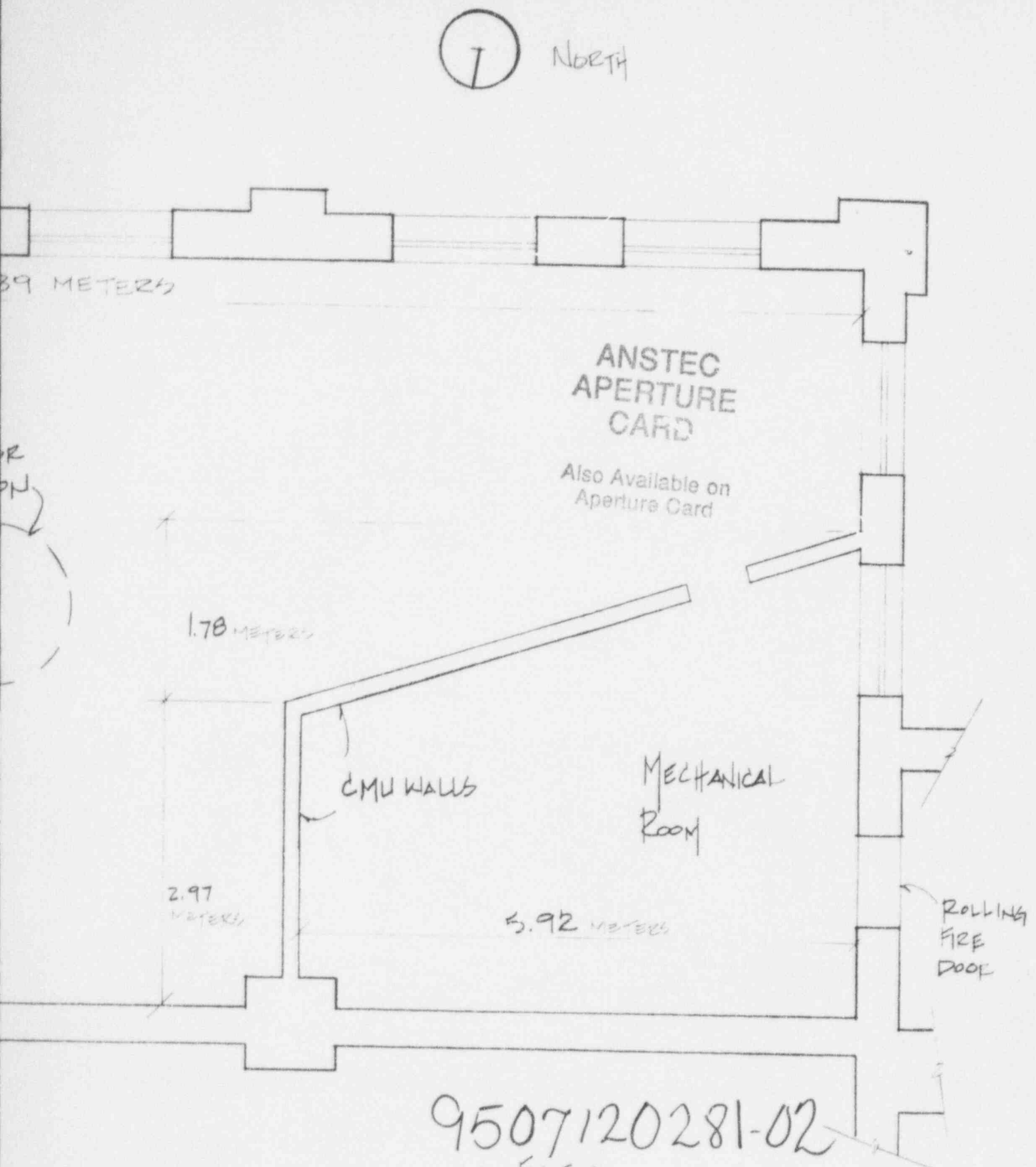


FIGURE C-2 MACHINE SHOP - (same as Figur

(showing interior partitions which created the Power R



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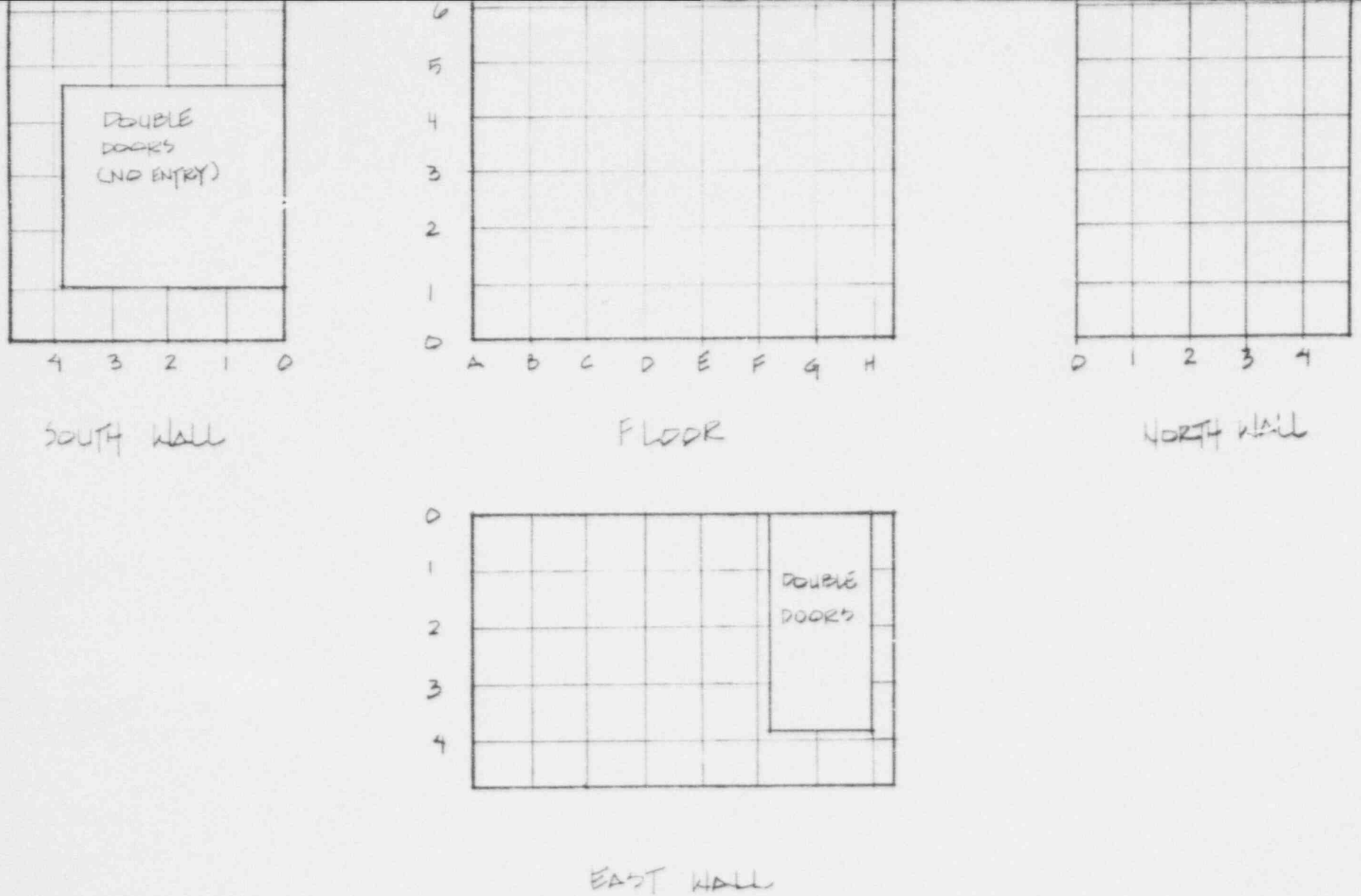
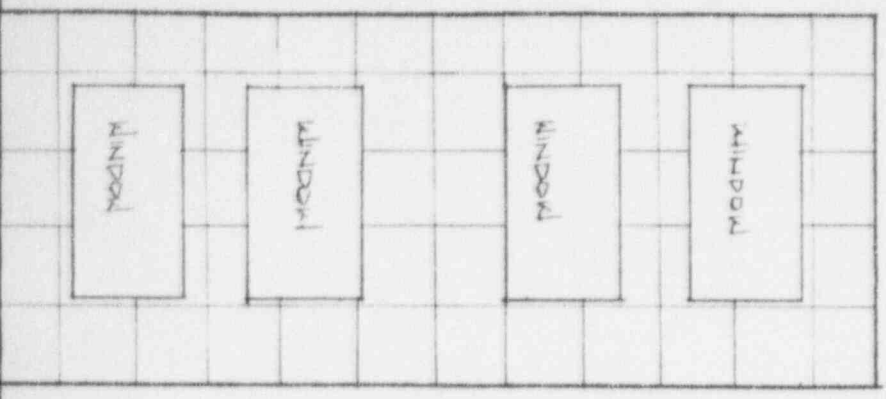
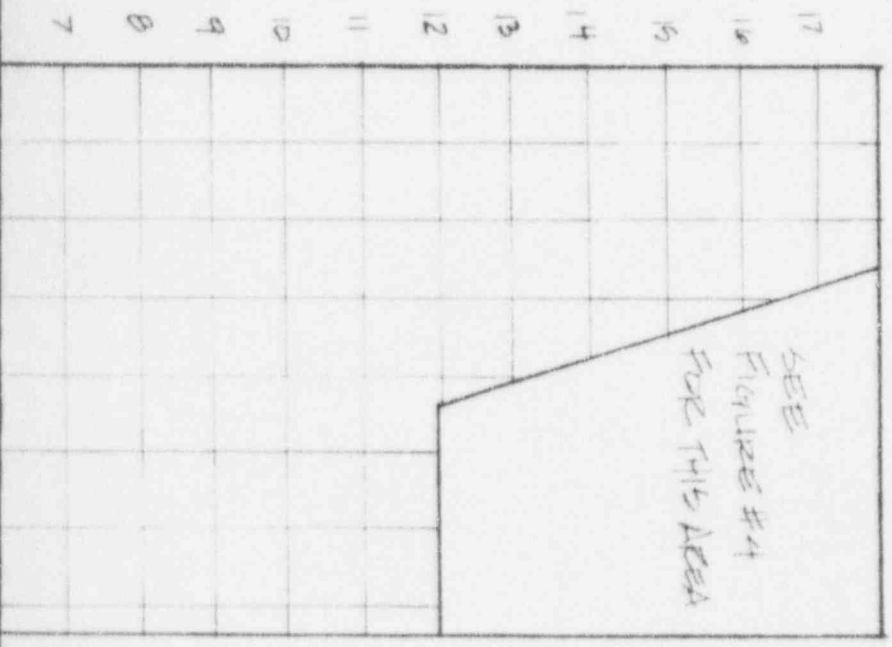


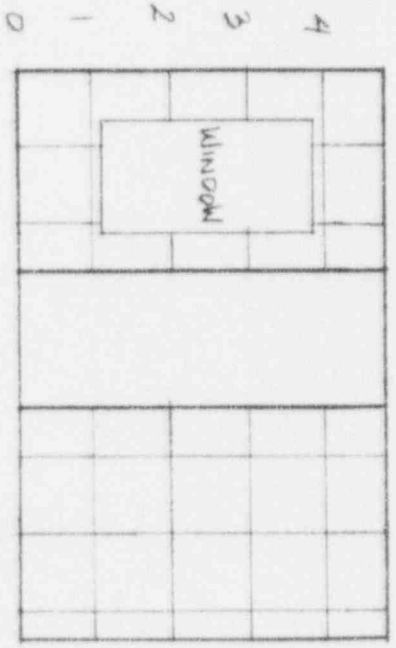
FIGURE C-3

POWER PLANT - MACHINE SHOP

one meter square grid







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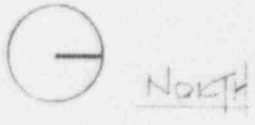
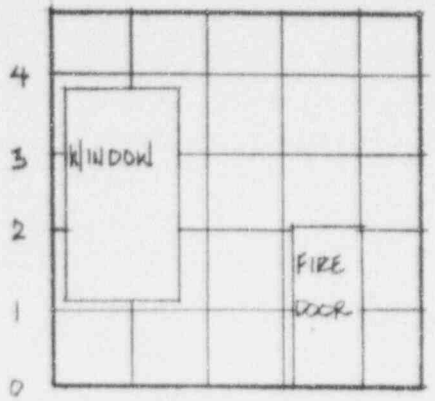
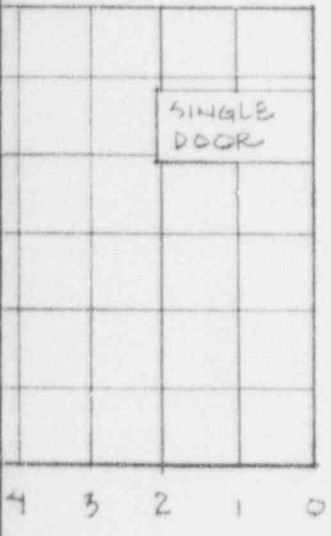


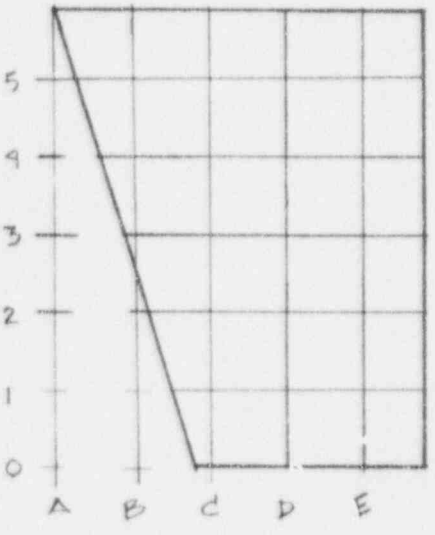
FIGURE C-4 POWER



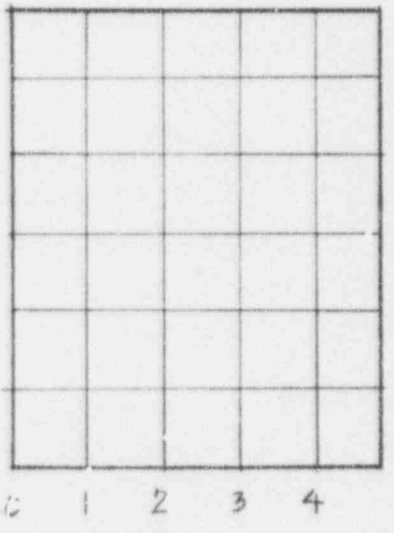
WEST WALL



SOUTH WALL



FLOOR



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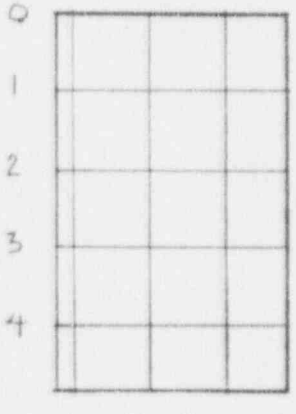

EAST WALL

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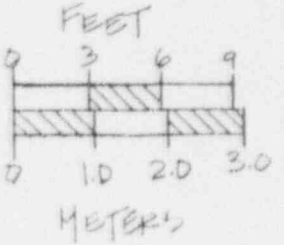

PLANT - MECHANICAL ROOM

one meter square grid