



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
34100 TRIESTE (ITALY) • P.O. B. 586 • MIRAMARE • STRADA COSTIERA 11 • TELEPHONE: 2340-1
CABLE: CENTRATOM • TELEX 400892 - I

H4.SME 346/8

SCHOOL ON
NON-ACCELERATOR PHYSICS
25 April - 6 May 1988

LABORATORI NAZIONALI del GRAN SASSO (INFN)

by

E. Bellotti
Universita degli Studi di Milano
Italy

LABORATORI NAZIONALI
del GRAN SASSO
(INFN)

Feb. '82 - 20 GLit (A. Zichichi president)
of INFN

June '84 58 GLit

— . . . —

Location: L'Aquila (≈ 130 km from Rome).

Construction under responsibility of ANAS

COGEFAR civil works
SAEM plants

1) Campo Imperatore
Extensive Air Shower Detector (G. Navarra)

2) External Buildings
- main building: administration, computer....
3 small buildings: offices, mechanical workshop
Gallium building

3) underground halls

(2)

Civil works - completed ≈ 200 000 m³
• problem: water

Natural conditions: 6-7 °C ; 100% humidity
insulating walls
air conditioning system

Safety:

- fire resistant doors (installed)
- pressure " " (structure) •
(5 kg/cm²)

Venting system

≈ 30 000 m³/h fresh air
≈ 80 000 m³/h from highway

Power supply

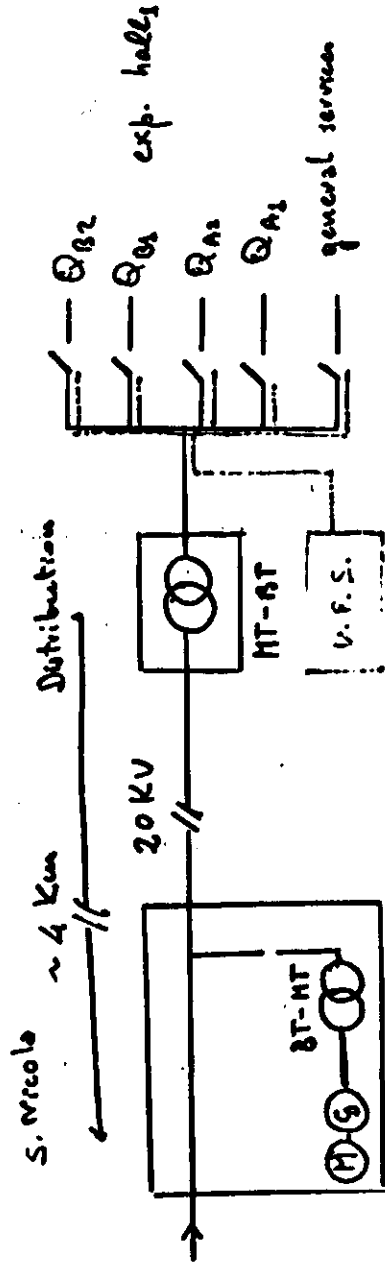
Standard power 20.5 MW → 1 MW (1988)
emergency " 1 MW

UPS not yet financed

("local" inverters for delicate electronics)

(4)

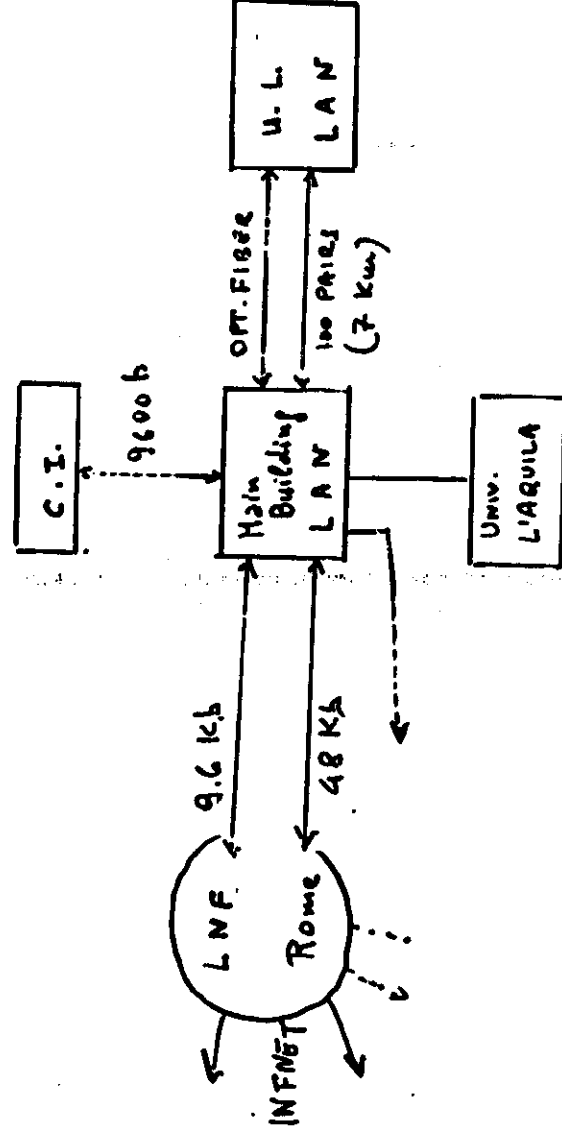
Power Supply



NT - 20KV - 50Hz
BT - 380V - 50Hz

4-5 Motor-generator

GRAN SASSO NETWORK



②

Physics Programme

- Geophysics:

fault movements
earth-tides
e.m. propagation
....

- Particle physics and astrophysics

A_S { • $\beta\beta$ ^{136}Xe (and bolometers) [E. Fiorini]
• solar neutrinos with Gallium [?] (Italy, France, Germany ...)

A_W { • LVD (Large ~~Area~~ Volume Detector)
• ν 's from collapsing stars
• μ physics; high energy ν 's

- MACRO

B { magnetic monopoles [J. Stone]
 μ physics
up-going ν 's (μ 's)
 ν 's from collapsing stars

New Projects (? lack of space!)

- Solar neutrinos with B
- $\beta\beta$ with enriched ^{76}Ge
- ν oscillation (?)

Future

(• Complete general plants)

- Service tunnel (7 km)

safety; general facilities

- 2 new halls - cryogenic detectors
new experiments

- external buildings

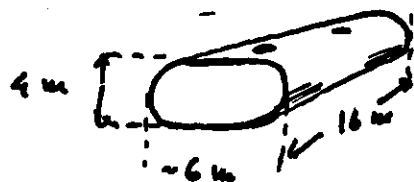
ICARUS (Liquid Argon TPC) [Rubbia?]

Tests at CERN on:

- purification O.K.
- electronics O.K.
- engineer design ~ O.K.

First steps:

- tests on background at G.S.
- electronics (wires)
- ~300 t movable detector



Final decision: fall '88

- EAS-TOP at C. Imperatore [G. Navarra]
- Gravitational wave antenna [Pizzella]
(~100 mK)

47° 27' N
13° 34' E of G.

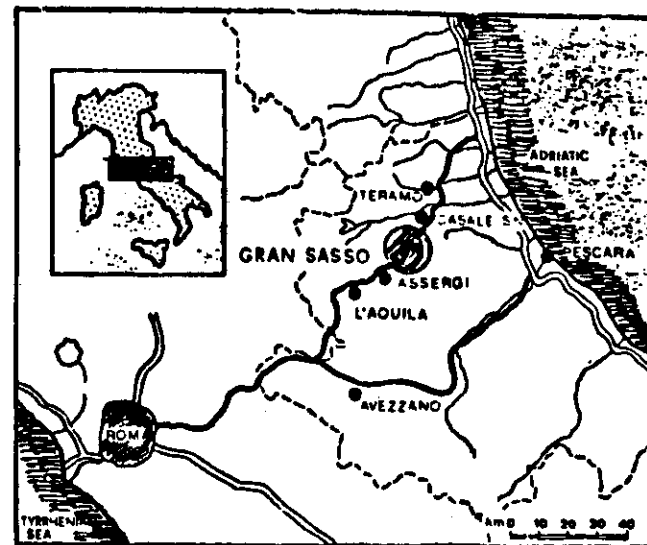


Fig. (S)1 Geographical map of central Italy [2].

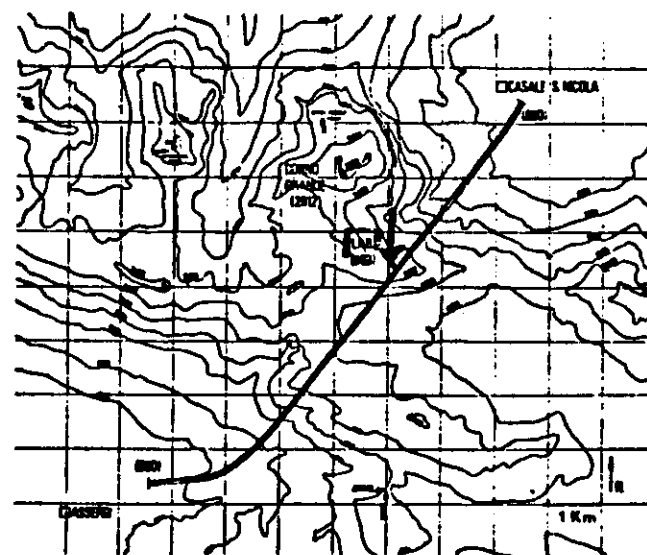
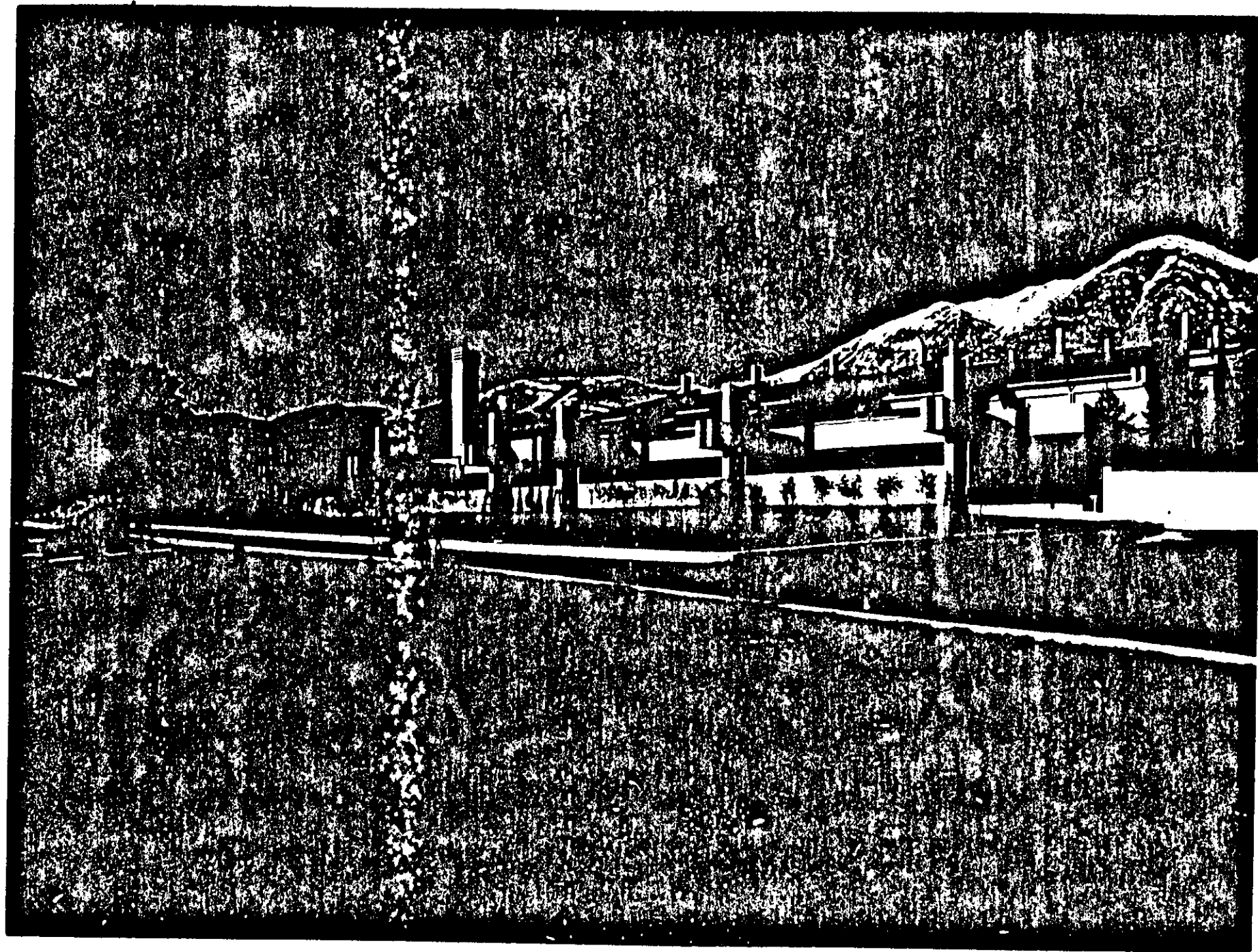
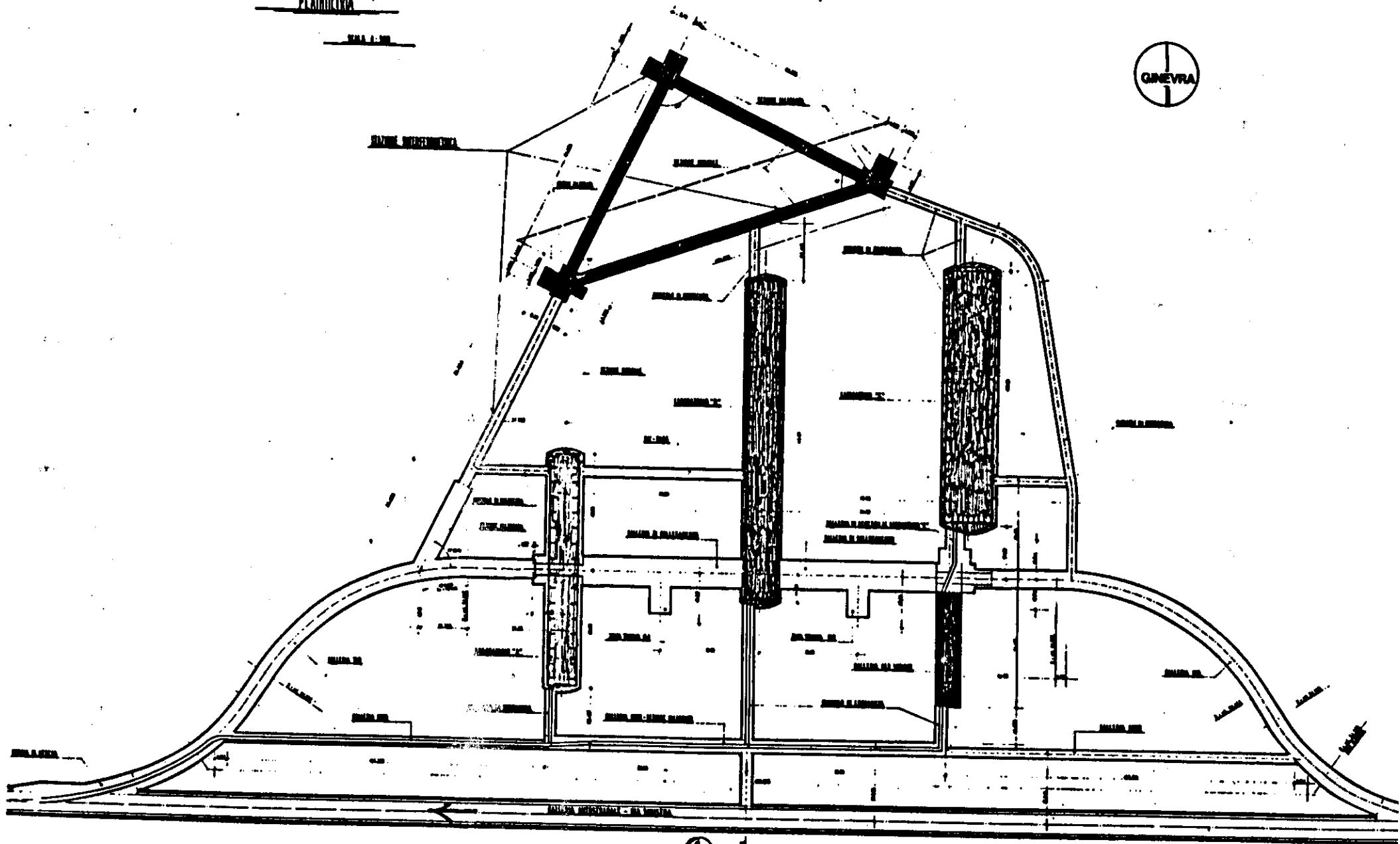


Fig. (S)2 Topographical map of the Gran Sasso tunnel area.



PLANIMETRIA

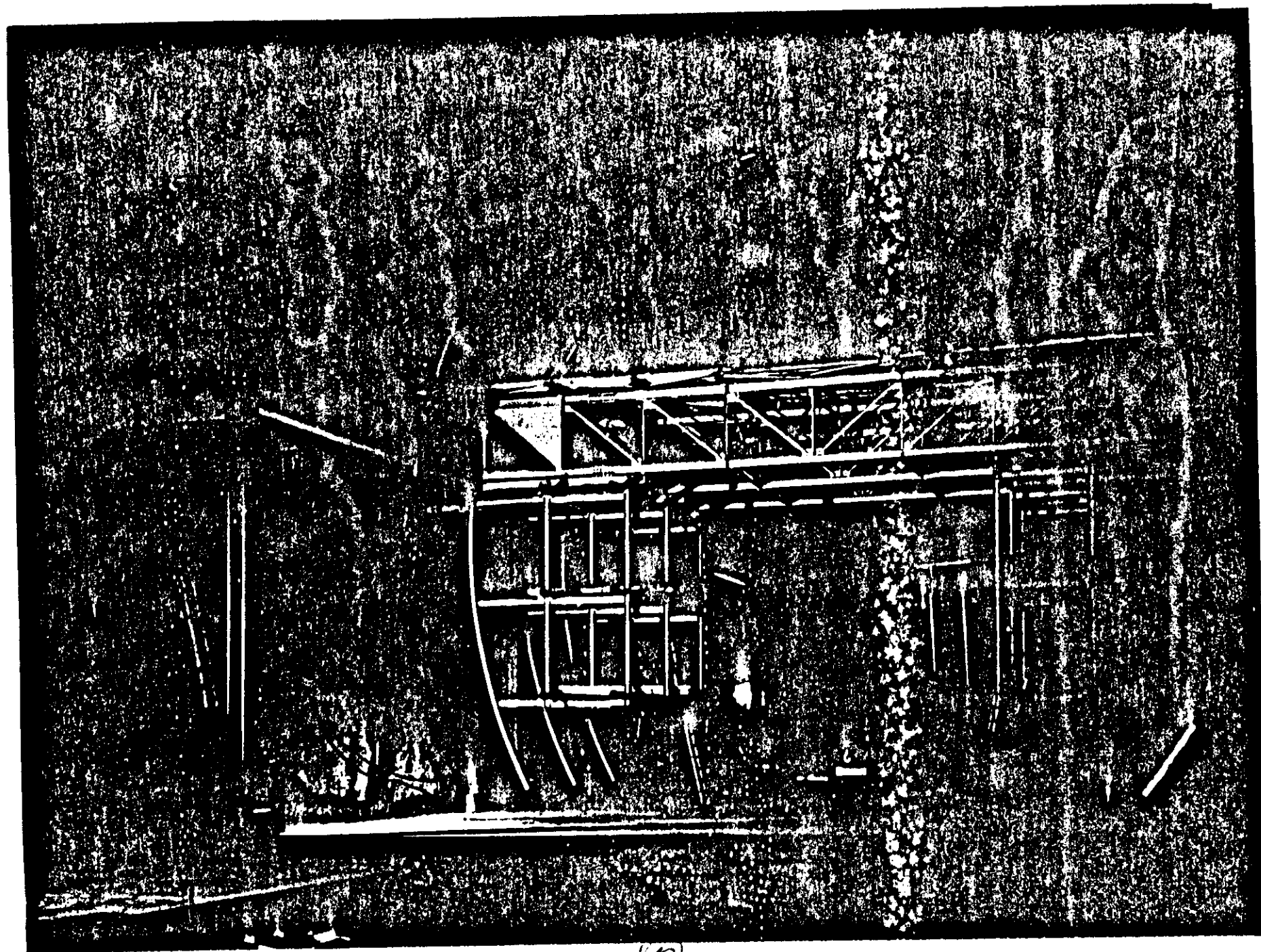
Scala 1:500

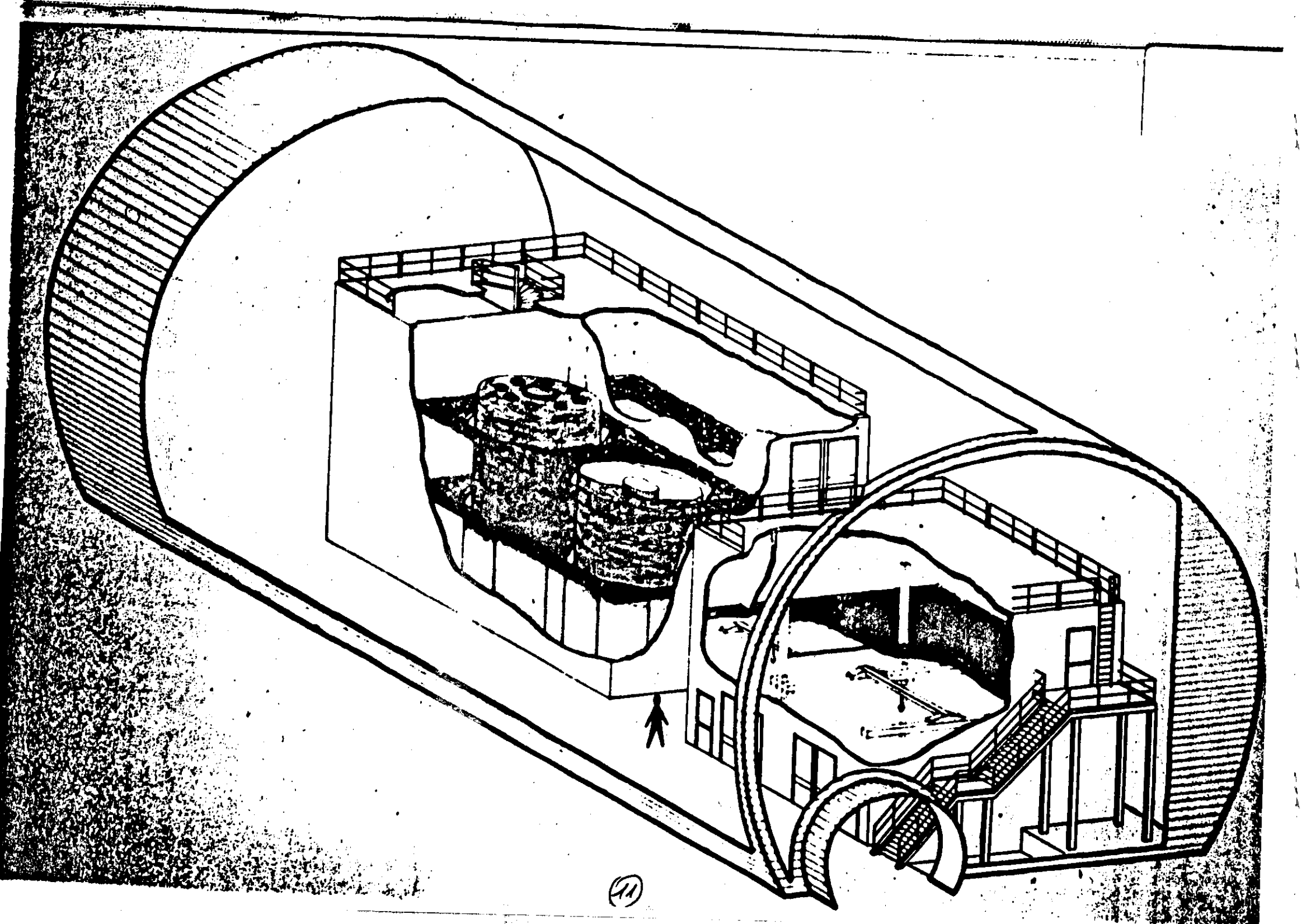


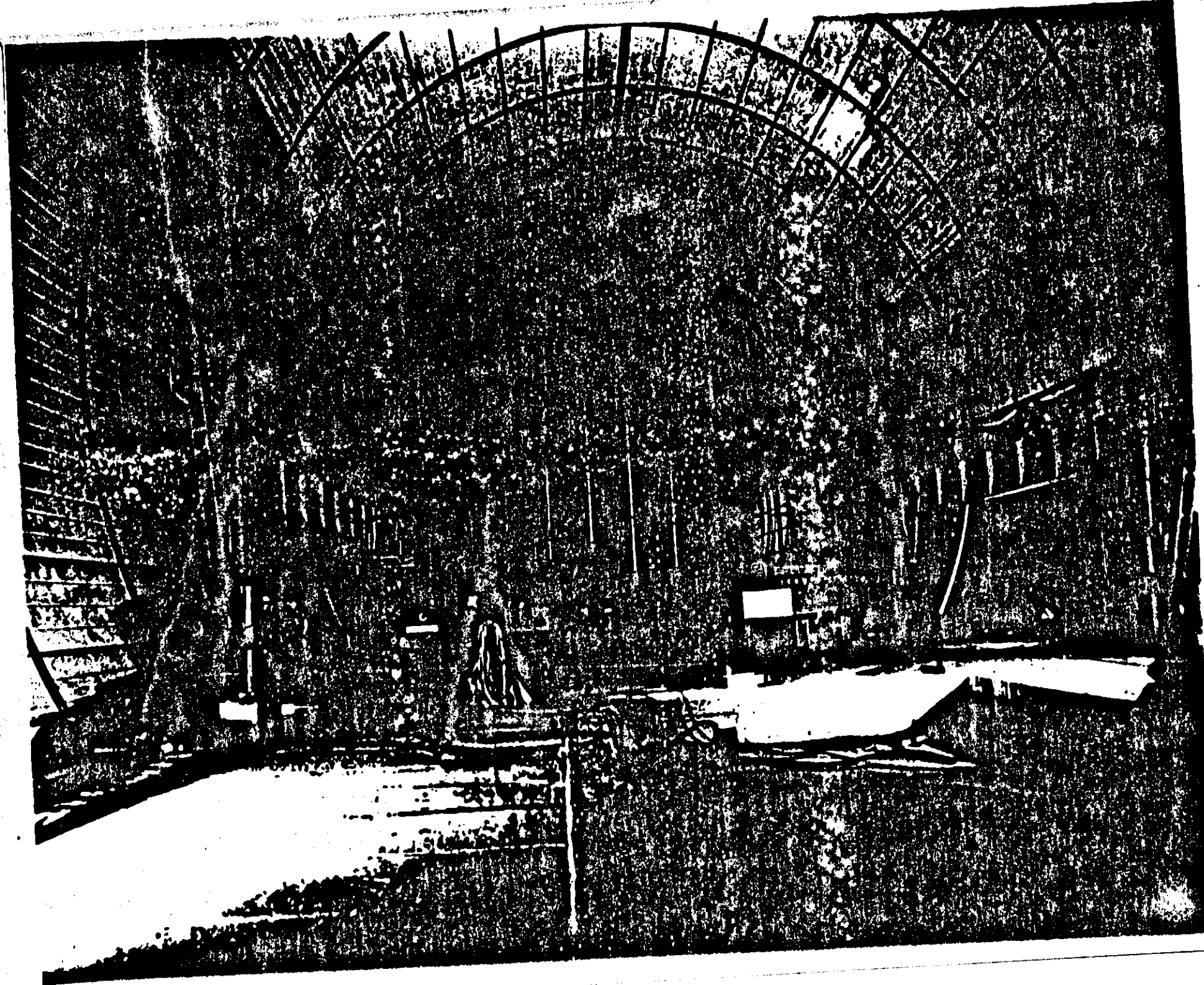


8









HA
105



LVD

(LARGE VOLUME DETECTOR)

DIMENSIONS (40 x 13 x 2) m³

MASS SCINTILLATOR = 1600 Tons

STREATER TUBE SYSTEM : 10 Layers horizontal

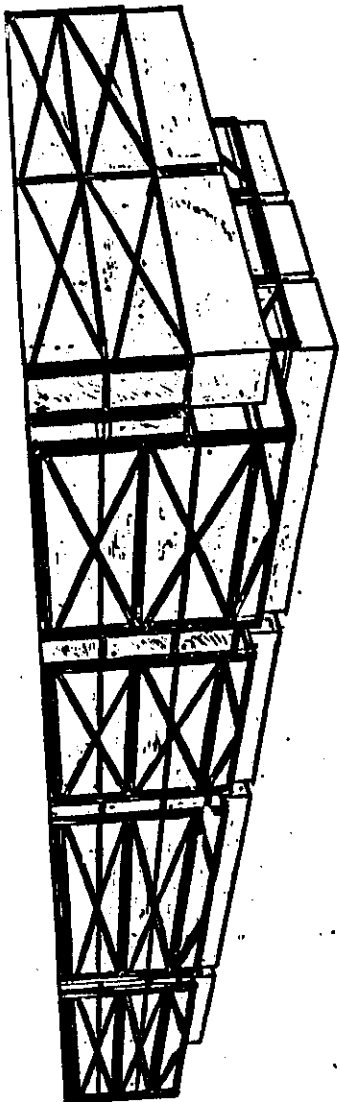
5 Layers vertical

MASS IRON = 1600 Tons

ACTIVE MASS SCINTILLATOR : free protons 1.7*10³

electron 6.4*10³

12C nucleus 7.4*10³



(14)

22.9.87

18.1.88

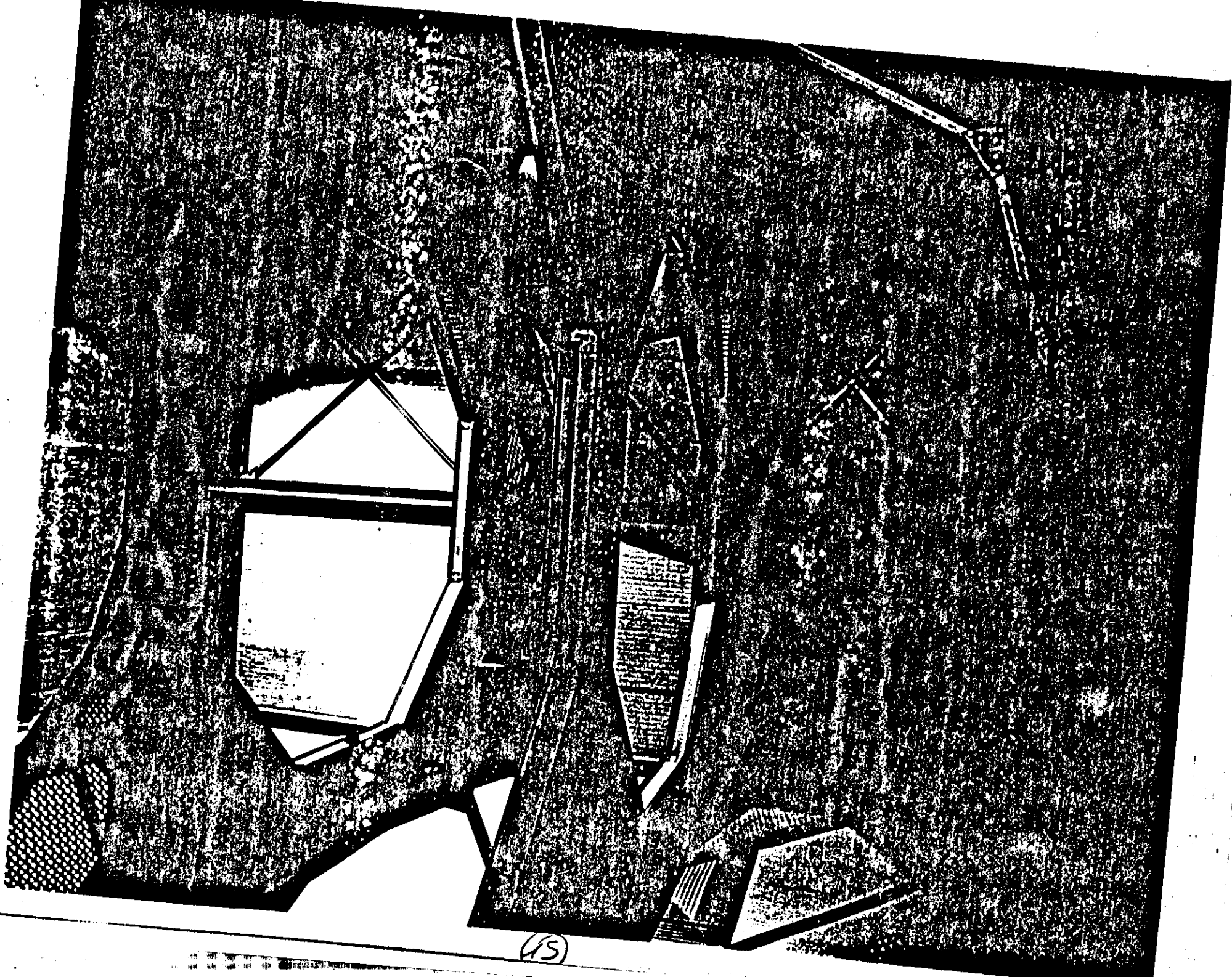
-20-

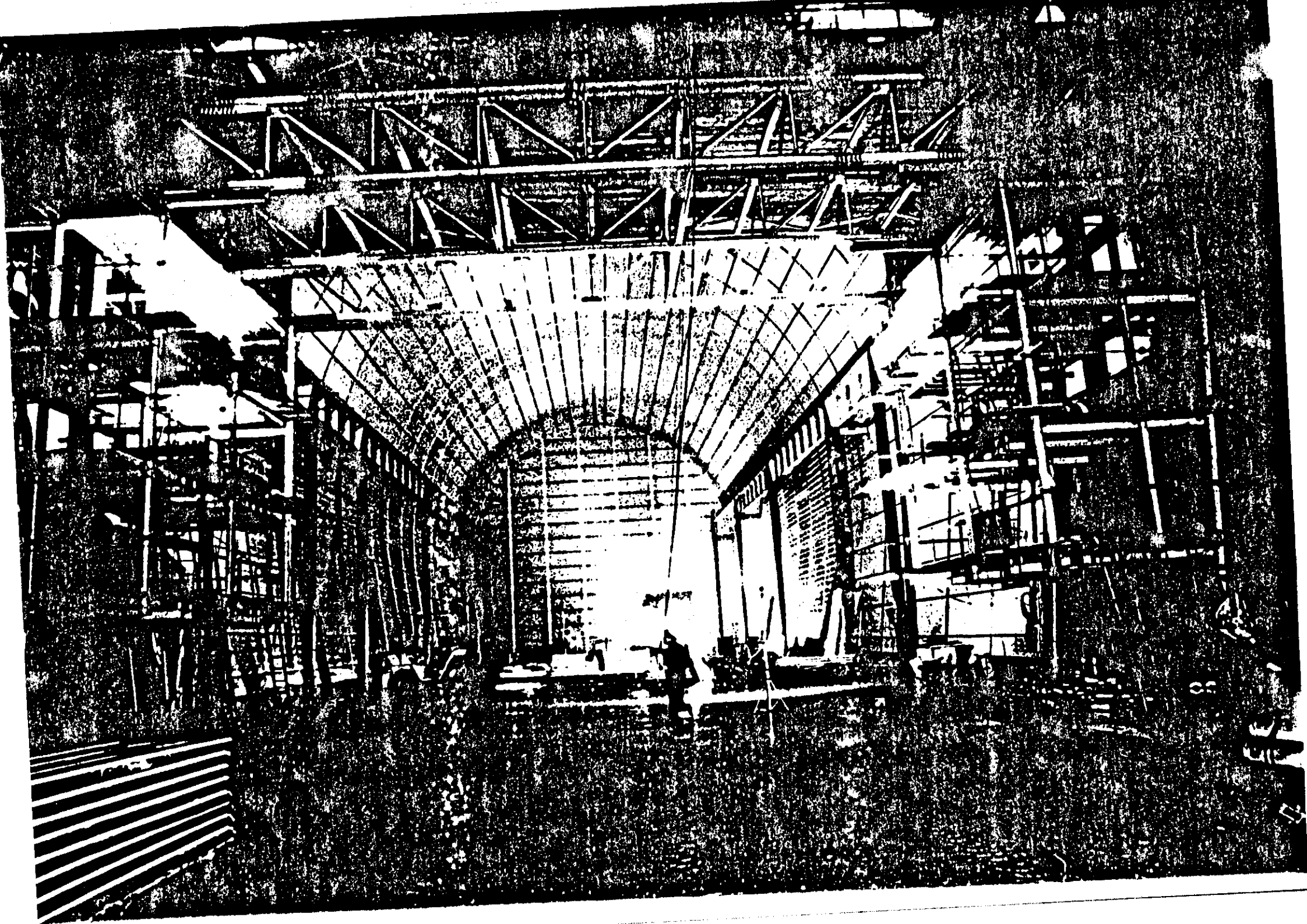


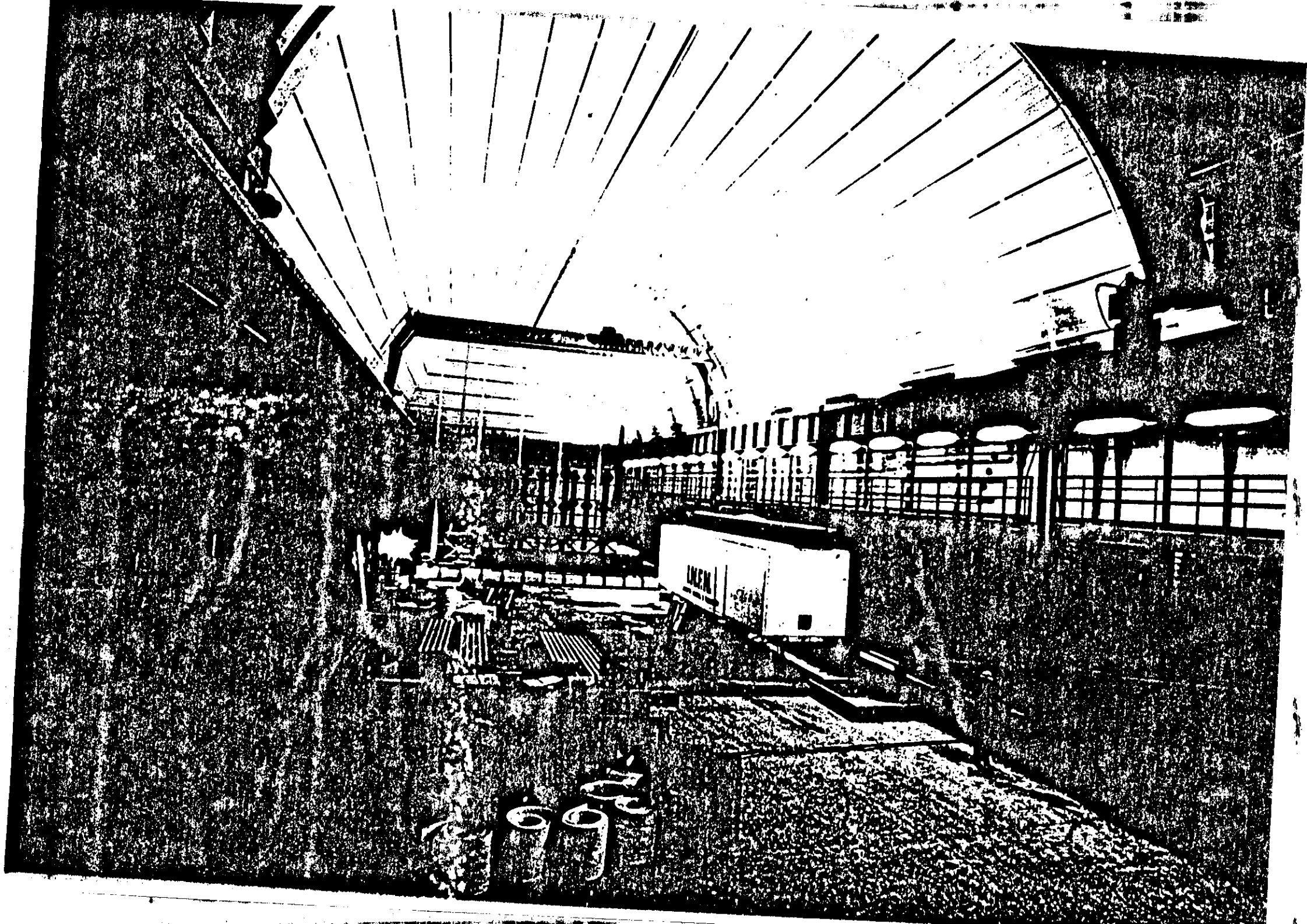
Set. 1987

-22-

22.9.83



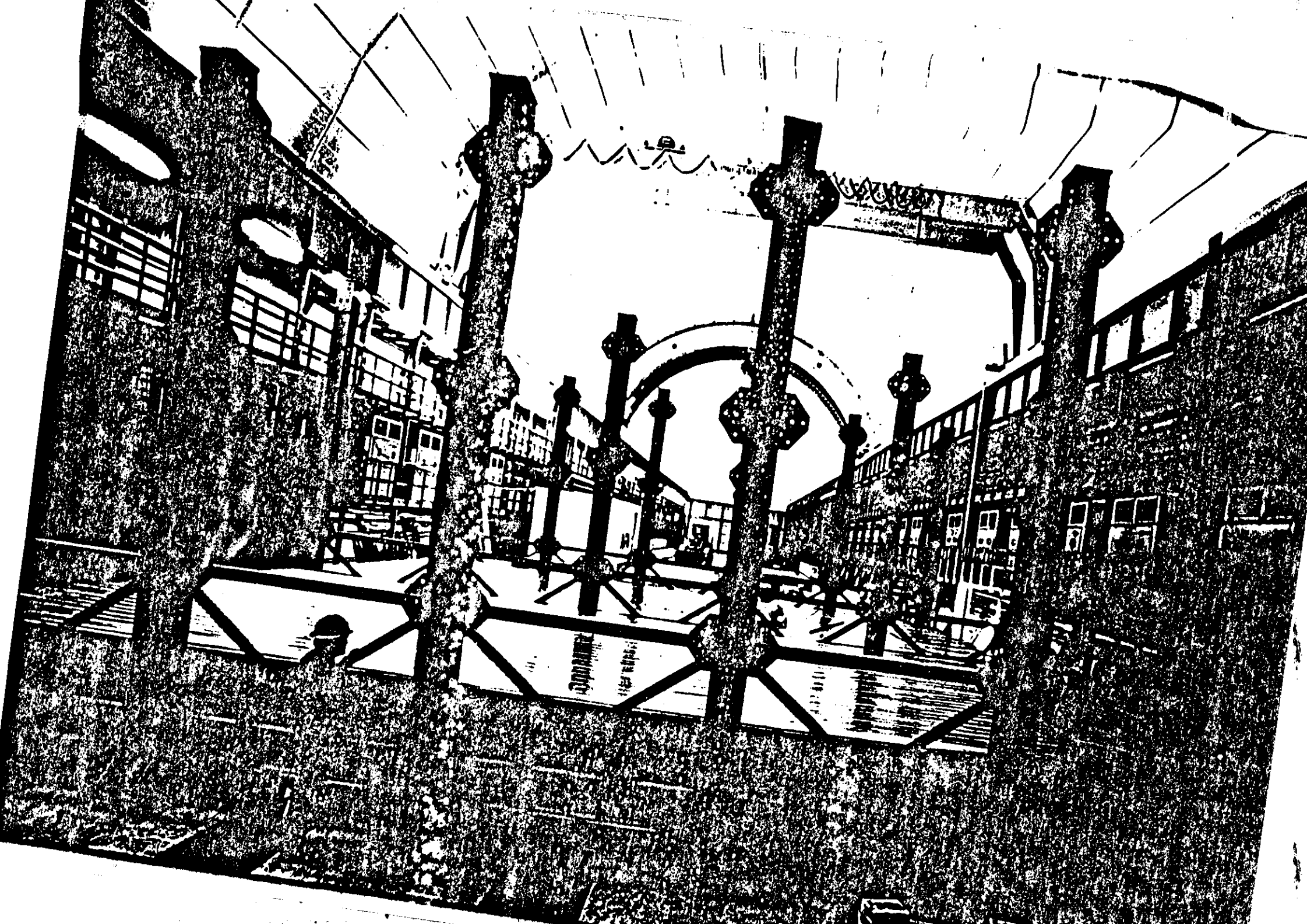






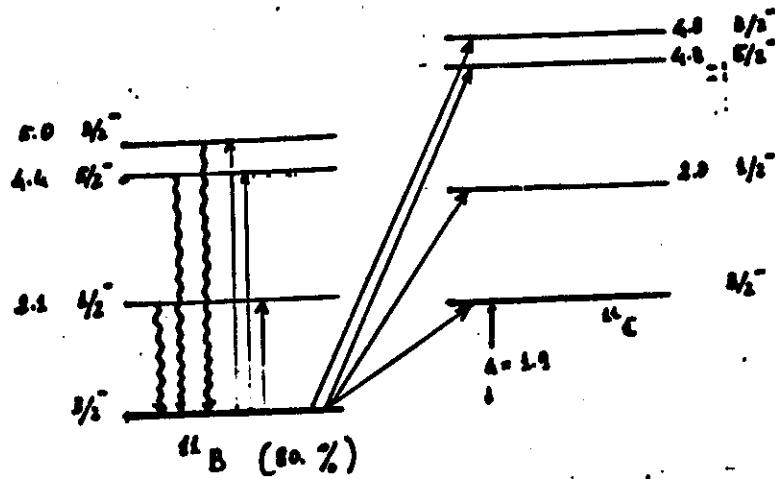
PROJET MANOCH
PORTAIS L40

-55-



BOREX

R.S. Raghavan, S. Pakvasa and B.A. Brown (Phys. Rev. Lett. 57, 1801 (1986))



Neutral currents (NUEX)		Charged currents	
e.l.	γ	e.l.	γ
-	-	o	5760
2.12	485	2.00	1125
4.45	285	4.82	675
5.02	375	4.84	840

γ in events / (kton x year)

TM B = trimethyl borate $\text{B}(\text{OCH}_3)_3$
~ 40% boron

