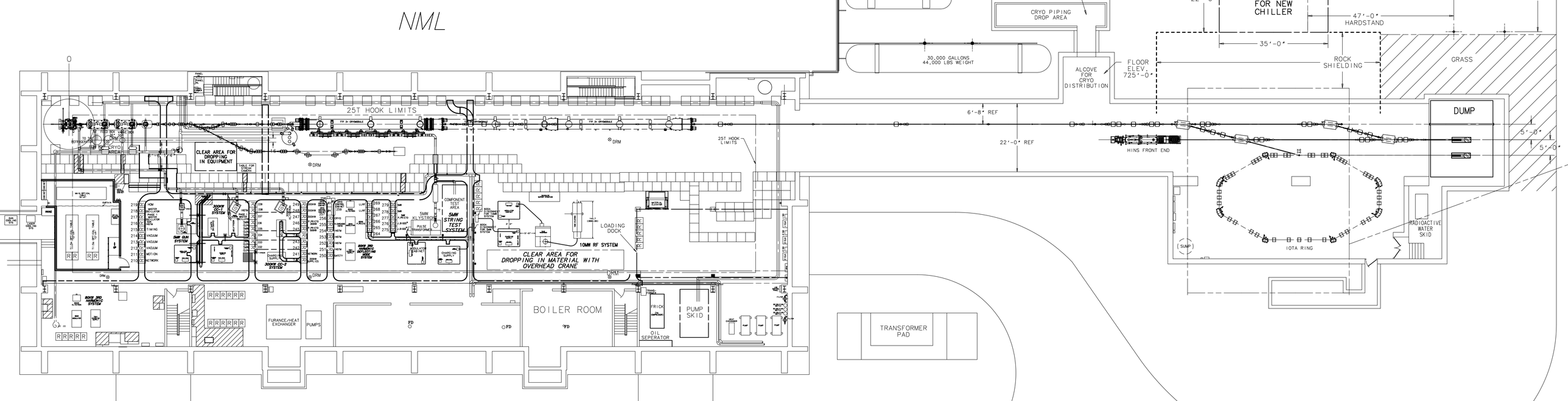
IOTA Proton/Electron Ring

Nominal p^+ beam kinetic energy	2.5 MeV (70 MeV/c mom.)
Nominal p^+ beam intensity	8×10^{10}
Transverse p^+ emittance r.m.s.	1-2 μm
Nominal e^- beam energy	150 MeV(g=295) or lower
Nominal e^- beam intensity	1×10^9
Transverse e^- emittance r.m.s.	0.1 μm (~2 μm at inj.)
Circumference	40 m
Bending field	0.7 T
Beam pipe aperture	50 mm dia.
Maximum b-function (x,y)	12, 5 m
Momentum compaction	0.02 ÷ 0.1
Betatron tune	3 ÷ 5
Natural chromaticity	-5 ÷ -10
e^- SR damping time	0.6s (5×10^6 turns)
RF V,f,q	10 kV, 30 MHz, 4
e^- Synchrotron tune	0.002 ÷ 0.005
e^- Bunch length, momentum spread	2 cm, 1.4×10^{-4}

Parameter	Value	Range	Unit	Comments
Cavity gradient	31.5	0-31.5	MeV/m	maximum is subject of R&D
Energy	800	50-800	MeV	1500 MeV with 6 cryomodules
Bunch charge	3.2	0.02-20	nC	maximum determined by cathode QE and laser power
Bunch spacing	333	10-∞	ns	
Bunch train *T*	1	0 – 1	ms	maximum limited by modulator and klystron power
Train rep rate	5	0.1-5	Hz	minimum may be determined by egun *T*-regulation and stability considerations
Emittance rms norm	5	<1 … >100	μm	Depends on bunch charges and laser configuration
Bunch length rms	1	0.01-10	ps	Function of charges & compressor design (two stages needed for
Peak current	3	>9	kA	3 kA with low energy bunch compressor; 9 kA possible with 3.9 GHz linearizing cavity


NML
CRYO PIPING DROP AREA
FOR NEW CHILLER
47'-0" HARDSTAND
35'-0"
30,000 GALLONS 44,000 LBS WEIGHT
ALCOVE FOR CRYO DISTRIBUTION
FLOOR ELEV. 725'-0"
ROCK SHIELDING
GRASS
DUMP
25T HOOK LIMITS
6'-8" REF
22'-0" REF
HINS FRONT END
5'-0"
5'-0"
CLEAR AREA FOR DROPPING IN EQUIPMENT
CRYO AREA
DRM
COMPONENT TEST AREA
5MW STRING TEST SYSTEM
5MW KLYSTRON
PULSE TRANSFORMER
LOADING DOCK
10MW RF SYSTEM
CLEAR AREA FOR DROPPING IN MATERIAL WITH OVERHEAD CRANE
RADIOACTIVE WATER SKID
IOTA RING
SUMP
BOILER ROOM
FURANCE/HEAT EXCHANGER
PUMPS
FRICK
OIL SEPERATOR
PUMP SKID
TRANSFORMER PAD