W-Band Accelerator Housing, ESB

5/31/97

D. Whittum

This note is a collection of items relating to plans for ESB.

Item 1

⇒*This was originally a memo dated 28 August 1996 initiating coordination with EFD for the ESB plan. This was followed up by Brad Youngman with a presentation to ARDB.*⇐

Please find attached three alternative plans (A,B,C) for a 41' enclosure in End Station B [*these are omitted in favor of the latest drawing*]. This is to request your comments on any and all aspects of the concept for the enclosure. Specific items include:

a)structural integrity with bracing---*i.e.,* should we toss out some of these plans as being too difficult or expensive to brace?
b)block availability --- I made use of the data you gave me on block on-site, but some may be in use or perhaps even departed
c)If one of the plans passes tests (a) and (b), could you give ARDB some guidance as to the effort required to develop a solid plan for an enclosure. This would include:

1)Estimate of hours for any drawings & engineering work required for a finished structural plan.
2)Estimate of hours for moving and emplacing blocks
3)Estimate of hours for bracing and bolting at 2 braces per block,
20 bolts per brace, and any additional assembly required

Also, if you could make an informed guess as to hours for development of:

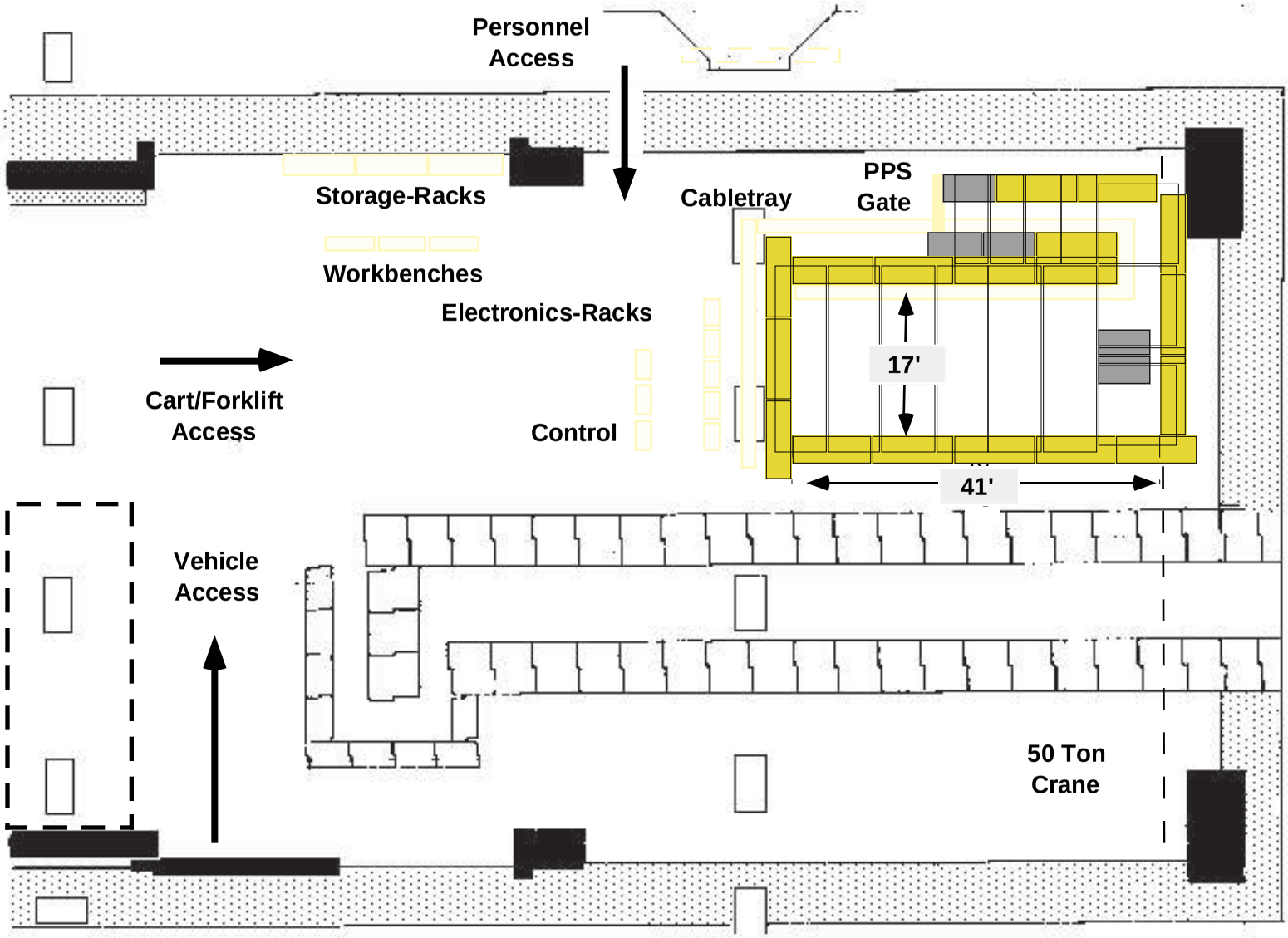
4)Radiation Safety Plan, including beam loss scenarios, economy class PPS gate, and area radiation monitors.
5)Earthquake Safety Plan
6)LCW install plan
7)Electrical plan including power distribution and one 2' cable tray, total length 80'

Al Menegat and I are available to assist in preparing such estimates. We would like to have some preliminary discussion of this matter at the 11 Sept. group meeting, Wednesday, 9AM, Beige Room.

cc: R. Siemann, A. Menegat

Item 2

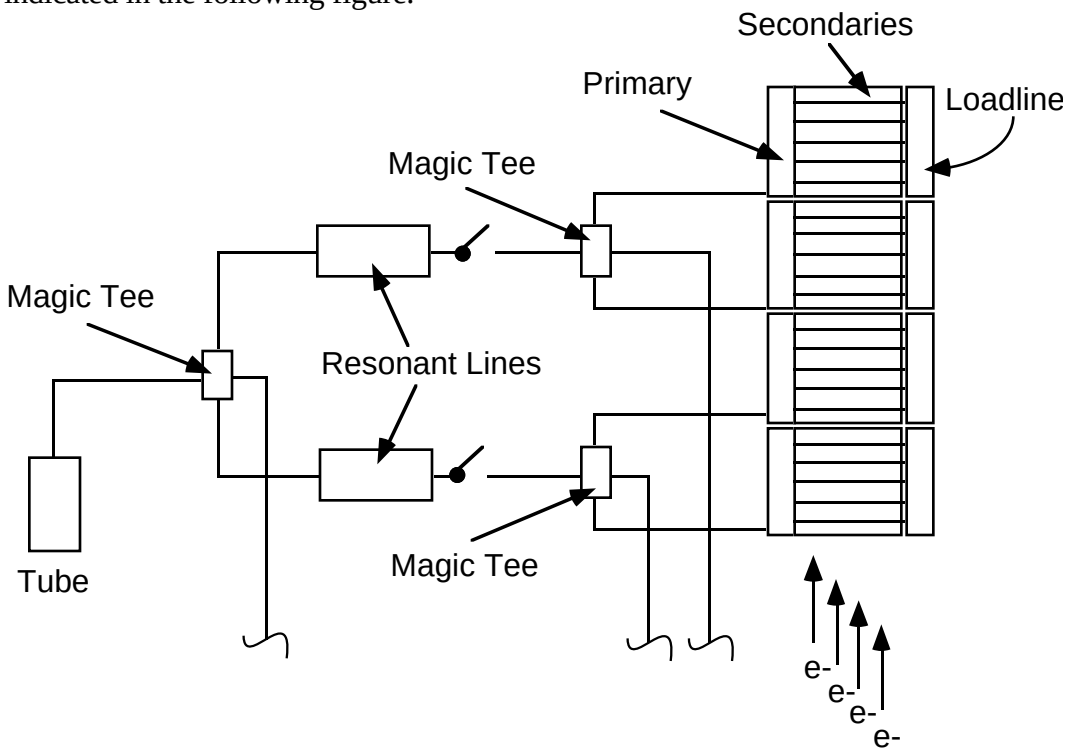
⇒*On the next page is the latest sketch, drawn to sccale using a scanned in scale drawing of ESB, "as built".*⇐


Personnel
Access
Storage-Racks
Workbenches
Electronics-Racks
Cabletray
PPS
Gate
17'
41'
Cart/Forklift
Access
Control
Vehicle
Access
50 Ton
Crane

Item 3

⇒Here is discussion of one klystron station, based on a 1 GeV linac powered by four 40MW tubes.⇐

In previous notes and discussions, we have considered a klystron station layed out as indicated in the following figure.



This sketch includes the planar ubitron tube running at 20MW, split once, each arm fed to a resonant line which is charged over 1μs, and discharged by an active switch, producing a 10ns pulse that is again split, with each arm fed to the primary of a matrix accelerator. The primaries are charged for 10ns, and the laser switches discharge each primary cell in 300ps providing 1GeV/m gradients for 50 separate beamlines passing orthogonally across the secondary lines.

Given that 5 TeV worth of linac powered in this way would require 30,000 tubes, and, more immediately, given that 1 GeV linac powered in this way would require 8 tubes, and more significantly 8 modulators, it seems worthwhile to have one tube split in total 8 ways. This increases the tube power requirement to 40MW, corresponding to 29% electronic efficiency. Such efficiencies have been exceeded for much higher voltage (3.5MV) free-electron lasers. To ask for such efficient tapering for a low-voltage, space-charge dominated ubitron is to push into new territory. Clearly though that is worth trying, for the overall linac concept, site-power, etc., and for the nearer-term 1 GeV linac.

As for particulars for a layout, recall that a standard slac modulator has a foot print of 4'x8', with 8' height. Items in the vicinity will suffer from pulsed noise. The ideal location for the tubes will be in the housing (so that no additional shielding is required for them, and so that no needless waveguide runs are required). In fact, this is likely the ideal location for the modulators as well, except for the circumstance of sensitive beamline instruments. Another drawback is that the housing becomes cramped. Next are drawings with modulator cabinets inside the housing and outside the housing.

Item 4 ⇒*Layout of housing with modulators.* ⇐