

11 November 1984

Memo to: Buck Peery
From: Larry R. D'Addario
Subject: Station Building Requirements

Reference: CC Memo No. 34

The sketches attached to the referenced memo contain numerous design details that are presented without explanation; some of these appear to differ from the recommendations which came out of the meeting we had on June 21, which was summarized by A. R. Thompson in VLBA Memo 356. In addition, I had presented several recommendations in a memo and sketch dated June 6 (unpublished), and these do not seem to have been addressed. In the present memo, I attempt to cover many of these concerns.

1. Building location. Your sketch indicates 60 feet from the center of the antenna to the nearest wall of the building. This appears to result in about 35 feet between the antenna foundation outer wall and the building. I see no reason that this cannot be reduced to 10 feet, or perhaps less. Although the 60 foot distance conforms to my request that it be less than 25 m, we still gain improvements in phase and delay stability by having shorter cables; also, it now seems that my estimate of the cable length from the vertex room to the ground may be too low.

2. Overall building size. The floor area has escalated considerably since the June discussions by virtue of the addition of an "antenna mechanics" room and a "tape storage" room. Neither of these is needed. We agreed that one week of tape should be stored, and this is expected to fit comfortably on a single shelf (7 to 14 reels of tape, 15 inches diameter by 1 inch thick). Storage for several times this requirement can easily be provided in the control room. Besides, the tapes should be kept close to the tape drives for both operational convenience and to ensure that they share the same environmental conditions. The large, general purpose room provides ample space for both electronic and mechanical work. There is no justification for a separate "mechanics" room. Indeed, the separation may produce problems; the floor plan you give indicates double doors from a loading dock into the mechanics room, but a single door restricts access to the "electronic" area. This may make it difficult to get large pieces of electronic equipment (e.g., racks) in and out. I suggest you have another look at my sketch of 840606, including Note 1. I again emphasize that it would be best to leave the furnishings and partitioning of the large room unspecified until we gain some operating experience.

It looks like the building you suggest is too large by at

least 240 square feet of floor space, or 297 square feet of outside dimensions. The cost of 2400 to 3000 square feet (for the 10 stations) could be much better spent elsewhere, perhaps by adding a similar amount of space to the Operations Center.

3. Doors. The equipment room is intended to have the best environmental stability achievable. To maintain this, we want to keep people out of there as much as possible. Access should normally be from the control room, and the door to the hallway should have latches and labeling which limit it to emergency use only. Both doors should be heavily insulated and well sealed, with automatic closing mechanisms. (These items were on my 840606 sketch.)

4. Cabling. You show a ceiling-level cable tray, which disagrees with our plan to run cables under the floor. Ensuring adequate structural support in the ceiling for such a tray would nevertheless be a good idea, but not if it costs more than a normal ceiling. The underground cables to the antenna should be buried quite deeply, certainly well below the local frost line, for good thermal stability. In order to provide for addition and replacement of cables without the need for excavation, a conduit is preferred. A single 12-inch conduit or two 8-inch conduits should be adequate. The ends should be plugged with at least 12 inches of thermal insulation to prevent air flow through them.

5. Isolated slab. Recent discussions with a maser manufacturer suggest that having an isolated mounting base may be unnecessary. Therefore, any extra cost for this should be identified during the design. The isolated slab need only extend under the equipment room, at most.

6. Roof. A pitched roof is shown, but a flat roof might be better. It allows better clearance for the reflector with the building moved closer, and less blockage of the horizon. If a pitched roof is used, then the resulting attic space could probably house the mechanical equipment room shown in your plan.

7. Electrical power. Your request for information on the power requirements is reasonable, but unfortunately we have not yet worked it all out. I would like to propose that three power busses be available around the station (although not necessarily all three in every room): (1) unprotected commercial line power; (2) emergency power, which is normally connected to the commercial line and goes down with the commercial line, but which can be brought back up using local generators; and (3) uninterruptable power, which is emergency power plus several hours of battery backup with sufficient buffering to prevent any loss of power during line failures and generator switching. Busses (1) and (2) will probably have to be provided in both 230 V, 3-phase and 115 V, 1-phase forms.

Bus (3) can be 115 V, 1-phase only.

We need to identify which equipment is to be served by each bus. It should be noted that the maser clock can be purchased with its own UPS (battery backup); in that case, it can be on bus (2). The main additional load on bus (3) will be the computer and communication equipment, so that we will know what is happening when an outage occurs. Equipment which does not need to be kept running during an outage but which may be sensitive to line transients should have its own transient protection and be plugged into bus (1).

8. Station vs "site." As a final comment, I hope we can all stop referring to the station, including the equipment and structures that go there, as a "site." The latter word refers to a piece of land on which something will be built (see, e.g., Webster's New Collegiate Dictionary). To outsiders, it must seem silly that we still refer to the "VLA site," as if the thing has yet to be built. While we're at it, we should also not refer to the VLBA antennas as "telescopes," since they will have negligible stand-alone capability. The VLBA will be operated as one telescope containing ten (and sometimes more) antennas. I suggest we use the word "station" to include an antenna, its receivers, recorders, other local equipment, and the structures containing them, as well as the land on which they sit.