DRAFT P. Napier, 2000-Feb-09.

12 Site development

The general location of the ALMA test site at the VLA is shown in Figure 12.1 and a more detailed layout of the antenna foundations and control room is shown in Figure 12.2.

Antenna Foundations: The baseline plan for antenna foundations is, at least initially, to provide only 3 foundations giving a long interferometer baseline of 100 m and a short baseline of 25 m. The two foundations on the 100 m baseline will be used for initial assembly and acceptance testing of the antennas by the two contractors, for initial single-dish testing of the antennas by the ALMA project and for interferometric tests that require the 100 m baseline. The 25 m baseline will be used for early interferometer tests and for tests that require the best possible phase stability, such as antenna holography using astronomical sources. The antenna foundations will be designed by the antenna contractors and installed under the responsibility of the ALMA Project. It appears likely that the two antennas will require significantly different foundation designs and so the two antennas will not be able to sit on each others foundations. This raises the issue of which of the two antennas should be moved from its initial assembly foundation to the 25 m baseline foundation. It currently appears that budget constraints will not allow procurement of an ALMA antenna transporter until after the time when an antenna must be moved to the 25 m baseline foundation. This means that the antenna will have to be moved by picking it up with a mobile crane and placing it on a low-boy trailer, pulling the trailer to the 25 m foundation and then placing the antenna on the foundation using the crane. Since current design concepts show the European antenna being significantly lighter than the US antenna, it will be easier to move it. Accordingly, the plan is to make the western antenna foundation a US foundation and the other two foundations will be suitable for the European antenna.

Baselines longer than 100 m can be provided if the project wishes to pay the cost of additional foundations and their fiber optic links. By placing a foundation out on an arm of the VLA baselines as long as the longest ALMA baseline, 10 km, could be obtained if necessary provided that locations are chosen where road access for the antenna transporter exists.

Holography Tower: Single-dish holography will be performed using a near-field beacon mounted on top of a tower. The tower will subtend an elevation angle of about 8 degrees which could be provided, for example, by a 50 m high tower at a range of 300 m or a 100 m tower at a range of 600 m. Figure 12.1 shows a location for the tower for a 300 m range and locations for ranges longer than this are available to the SE of this location. The final choice of the tower location is a tradeoff between the difficulty of the near-field correction and the height of the tower. The 300 m range is 0.004 of the far-field distance ($2D^2/ \lambda$) at 86 GHz. Since the JCMT has demonstrated near-field holography to the required accuracy at a distance of 0.005 of the far-field distance, the 300 m range is probably adequate.

Electrical Supply: The antennas are specified to operate correctly on both 50 Hz and 60 Hz electrical supply frequency, on the European standard voltage of 400 volts 3 phase, 230 volts single phase. The baseline plan is to provide these voltages to the test interferometer at 60 Hz from a transformer connected to the VLA site electrical supply. If a test at 50 Hz supply frequency is considered essential before sending equipment to Chile a motor/generator will be rented for a few months (cost approx $2300/month). If it is considered essential to operate on a 50 Hz supply for the full duration of testing at the VLA this baseline plan will have to be changed to one in which the project purchases a motor/generator prior to antenna acceptance. As well as the 400/230 volt supply a supply at the US standard voltages (208 volts 3 phase, 110 volts single phase, 60 Hz) will be made available to the antenna contractors for their assembly equipment if they require it.

Control Room: Space for an ALMA Control Room will be made available in the VLA Control Building at the location shown in Figure 12.2 which has line-of-site to the ALMA antenna locations. Electrical wall outlets in this room will provide only 110 v, 60 Hz. Equipment requiring 230 v, 60 Hz will use portable transformers. If a 50 Hz source is available at the site and is required it can be brought to the room using temporary cabling.

Space for equipment which needs to be in a screened room because of RFI generation is available in the VLA Correlator screened room approximately 35 m from the ALMA Control Room.

Other Infrastructure: Office space, lab space and sleeping accommodations are available at the VLA site.

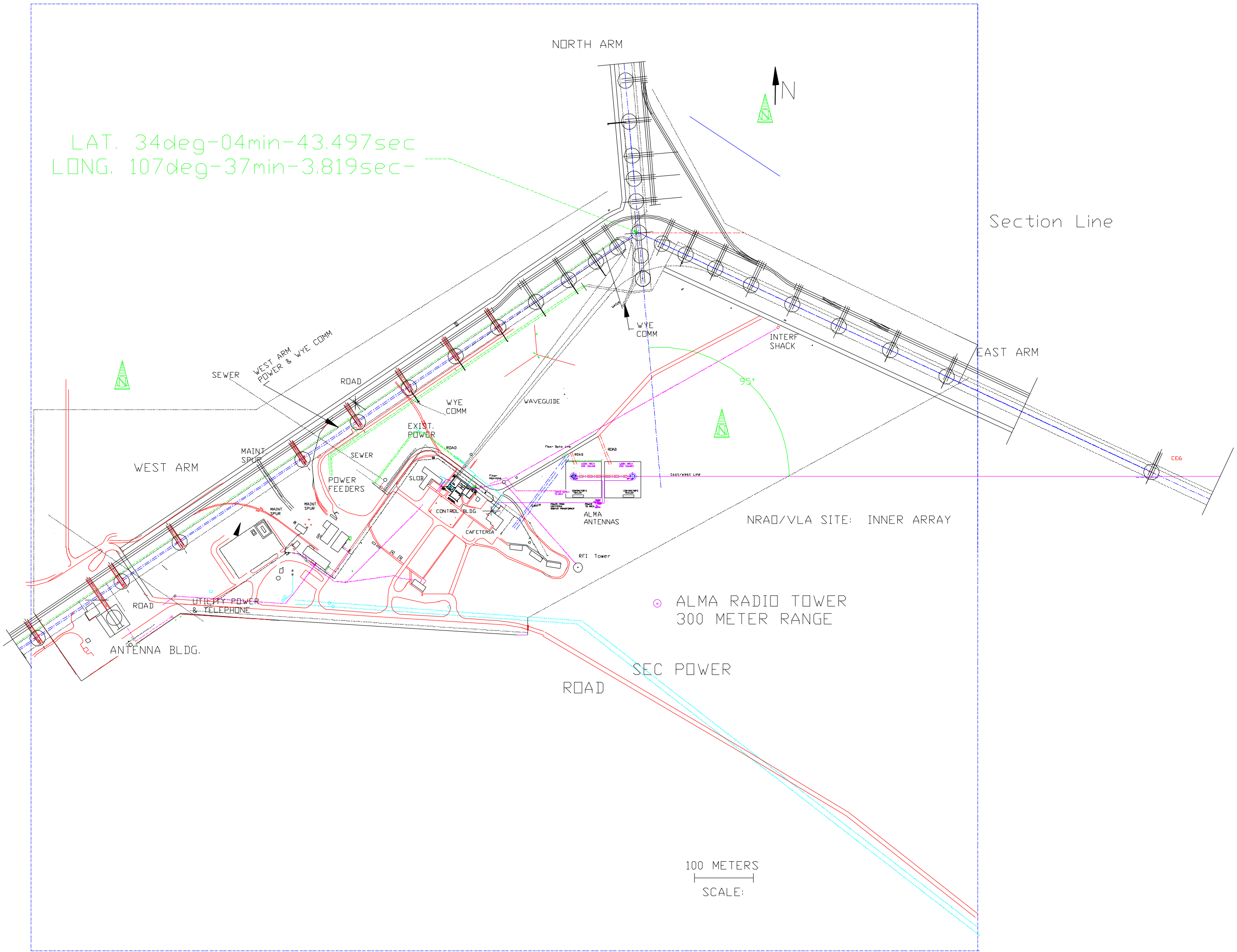

Figure 12.1 Location of the ALMA Test Site at the VLA.

The two antenna foundations for the 100 m Test Interferometer baseline are shown in the two square boxes approximately 600 m south of the center of the Y. The location of the tower for the holography beacon for a 300 m range is SSE of the Test Interferometer and tower locations for ranges longer than 300 m would be SE from there. The 1.6 km square box labeled “Section Line” marks the boundary of the property owned by NRAO. NRAO also has access to 200 m wide strips of land centered on the lines of VLA antennas. The VLA Antenna Assembly Building and Transporter Building are located in the Antenna Bldg. Complex on the left edge of the figure.

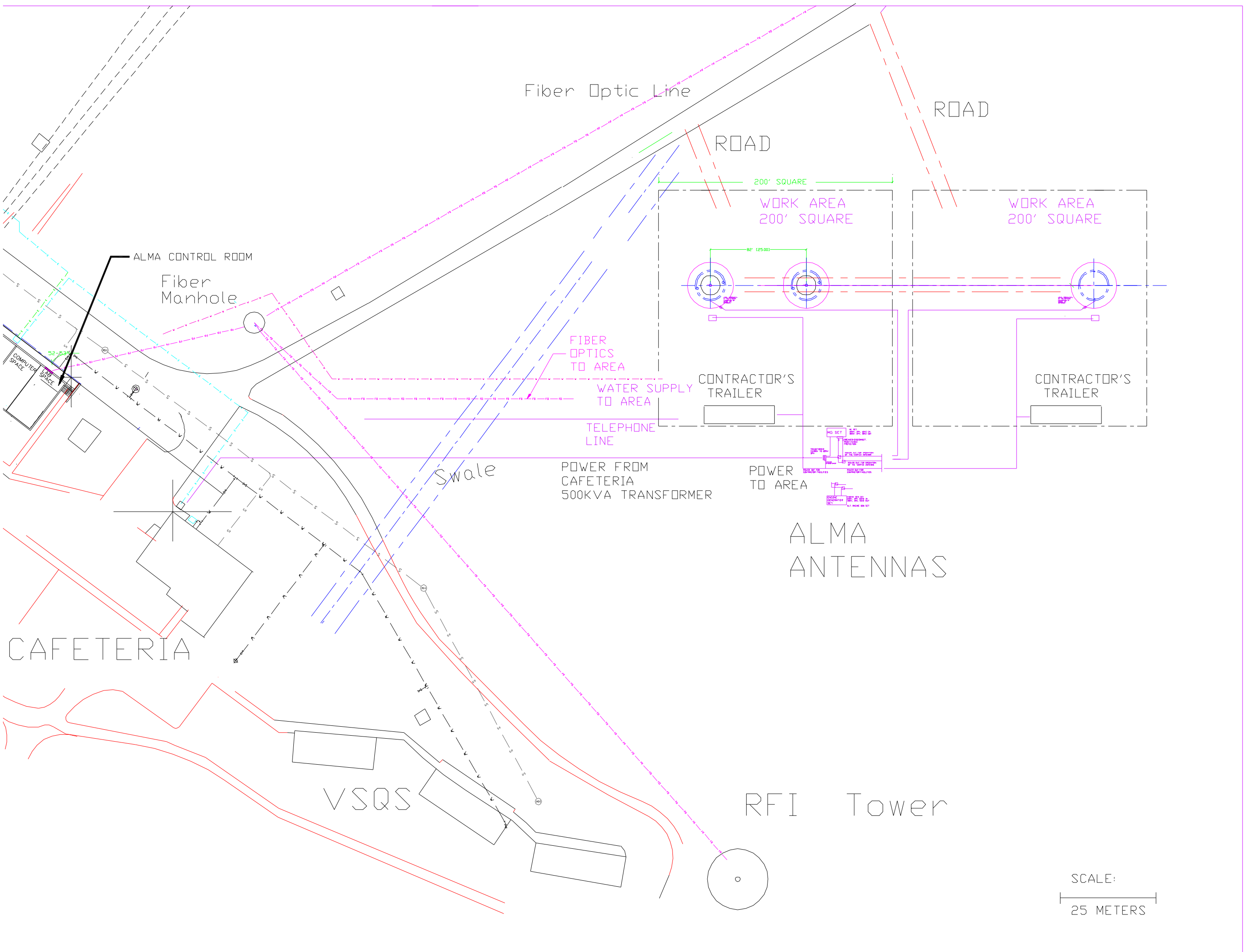

Figure 12.2 The 3 antenna pads of the ALMA Test Interferometer

The Control Room for the ALMA test interferometer is located in the VLA Control Building on the left hand side of the figure.