

Choice of Site for the Southern N.M. Antenna

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Several possible sites are currently being considered for the VLBA antenna that will be nearest to the VLA. These locations have been selected for proximity to a power line, line-of-sight to a mountain from which there is line-of-sight to the VLA site, and satisfactory (u,v) coverage as determined by Craig Walker's calculations. This memorandum will mainly summarize the relative advantages of two of the sites.\* Their locations are as follows:

North T or C Site The exact location is not specified but would be 20 to 25 miles north of Truth or Consequences in the Rio Grande Valley, and fairly close to the power line that runs approximately parallel to I25.

North Winston Site The site is about 10 miles north of Winston on state road 59, approximately 3 miles west of the junction with state road 52. A power line crosses the road at this point.

Relative Advantages of the Two Sites

The most obvious factors relevant to these two sites are summarized in Table 1. The power line at North T or C is a high-voltage, three-phase one, and connection to it at any desired point would not be possible. It would probably be necessary to run a line from an existing transformer station. Buck Peery has obtained a very rough estimate of \$150k for the cost of such a line. The power

\*An addendum discusses a third site at Pie Town

Table 1. Factors Relevant to Choice of Site

	North T or C	North Winston
Elevation	Approx 5000 ft	Approx 7000 ft
Radio Interference		Shielded from White Sands by San Mateo range
Power	High Voltage, 3-phase	Single phase
Land Owner	Mainly BLM	U.S. Forest Service
Microwave Repeater Site	South Baldy (power available)	Mt. Withington (no power) South Baldy (marginal)
Link Distances	50 km + 40 km via S. Baldy	50 km + 25 km via Mt. Withington. (74 km + 40 km via S. Baldy).
Accessibility	Approx 55 miles from Socorro: 47 miles on I25 plus about 8 miles on US 85 (parallel to I25)	Approx 45 miles of unpaved road (state road 78) to VLA site. Driving time approx 1½ hours in good weather. Approx 96 miles from Socorro via I25 & state road 52 (paved)

line at North Winston is single phase and may have to be upgraded, since items such as helium compressors run on three-phase power. Buck has obtained a rough estimate of \$85k for this, contingent upon three-phase power being brought into Winston, which is in the plan of the electric company for 1984.

South Baldy is just visible from the North Winston site: the peak is 7 arcminutes above a saddle in the San Mateo Mountains. We probably cannot use a repeater site on the peak, since this would be incompatible with equipment for measuring atmospheric fields there erected by New Mexico Tech. Thus S. Baldy is only a marginal possibility for a repeater site from N. Winston. Probably the only point on S. Baldy on which we could place a repeater is West Knoll which is south of the main peak. The Forest Service have a repeater there. However, there is a strong desire on the part of NMIMT (and also NRAO) to prevent S. Baldy from becoming a heavily used repeater site, and several private and other organizations have sought unsuccessfully for approval to place communication equipment there. Thus we should not seek to use S. Baldy for a repeater unless no good alternative exists. Note that the local oscillator link can use a passive repeater, but an active one is almost certainly required for the IF (analog or digitized) because of the wider bandwidth. A solar-powered active repeater on Mt. Withington is a possibility. The road to the summit of Mt. Withington is shorter and less steep than that to the summit of S. Baldy.

The North T or C site is close enough to the town of T or C that it may be possible to find a local person to change tapes if necessary. It is unlikely that such a person could be found in Winston.

At some future time a fiber-optics data system may be available in the Rio Grande Valley, which could be useful if the North T or C site is chosen.

In summary, the north T or C site is better with regard to accessibility. The North Winston site has an elevation advantage (which has not been quantified) and should have less interference. It is also a much less prominent site and an antenna that would attract less public attention. Significant problems for power and the radio link exist for both sites.

#### Further Alternatives

The vicinity of state road 107, which runs from Magdalena in the general direction of south to I25, has also been investigated. Single-phase power is available over most of the length of this road. Both Mt. Withington and South Baldy are visible, and in many areas the microwave tower on Gray Hill, approximately 10 miles east of the center of the site, is also visible. The last is out of sight over most of the southernmost 18 miles of 107. The (u,v) coverage from this vicinity is judged by Craig Walker to be somewhat less desirable than the north T-or-C site. This area does not appear to offer a serious alternative site at this time.

The hamlet of Dusty, about 11 miles north of the North Winston site, has been mentioned by Craig Walker as possibly giving better (u,v) coverage than North Winston. Upgrading of power to three phase would almost certainly be much more expensive than at North Winston, so from a practical viewpoint Dusty is not an attractive site.

Further investigation of a site near Pie Town is now being considered. The microwave link would be by way of Davenport Peak, which is used as a repeater site by M.C.I. Thus power would be available for an active repeater. Pie Town may turn out to provide the simplest practical solution.

#### Addendum: The Pie-Town Site

Following reexamination of the (u,v) coverage obtained from the vicinity of Pie Town, which was found by Craig Walker to be satisfactory, P.J. Napier & A.R. Thompson visited Pie Town on November 3, and also the two possible repeater sites that could be used from this location. These are Davenport Peak, and a microwave tower site approximately four miles south west of Davenport Peak and half a mile south of US 60. Davenport peak is visible from the VLA site, M.C.I. have a microwave tower there, and the Forest Service also use it as a repeater site. The tower south of US 60 does not appear to be visible from the VLA site, but it is presumably visible from Gray Hill. Both repeater sites have electric power.

The antenna site near Pie Town that was investigated earlier in the year is on state road 36 about three miles north of the town. Neither repeater site is visible from this location, although the Davenport microwave tower appears from behind the Sawtooth Mountains if one drives a few miles further north on 36. However a better antenna location was found on US 60 between Pie Town and the Continental Divide which is just two miles east of the town. Both microwave towers, and the peaks on which they are located, are visible over most of this stretch of highway. Three-phase power at a voltage that can be tapped by transformer, and telephone, are also available. From about one quarter of a mile west of the Continental Divide to the edge of the town the road runs through a small area of BLM land. The elevation is approximately 7800 ft. Thus an antenna site in this location seems to be almost ideal from all practical viewpoints. The only negative aspect of the location is that in the (u,v) phase it does not compensate for the foreshortening of the array at southern declinations as well as a site in the Dusty or Winston areas would. The cost saving in the electric power connection, and the relative simplicity of the microwave link problem for this site, argue strongly in its favor as the best choice for the first of the three antennas that may eventually act as extensions of the VLA. A conversation with J.T. Williams, an M.C.I. representative for route development located in Richardson, Texas, indicates that M.C.I. would consider leasing space on their tower at Davenport Peak if we require it.

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