Interoffice

National Radio Astronomy Observatory

Very Large Array

March 3, 1980

To: H. Hvatum

From: W. G. Horne

25 METER MILLIMETER WAVE TELESCOPE
MEMO No. 133

Subject: Review of 25 Meter Status

In my memo of 11 February 1980 I stated that I would complete a man hour estimate for the NRAO effort for the remainder of the year and get it to you shortly. This then is that estimate. I trust you will recognize that in the limited time and with the limited documents I have available there is the possibility (indeed probability) that the estimate will be subject to some errors. I might have overestimated in some areas because of more work having been done than I am aware of but in some areas (astrodome for example) it is possible that I have underestimated the hours required. In general, I feel sure that you will tell me I have overestimated the required effort and the people who will have to do the work will tell me that I have underestimated the individual effort required.

This estimate includes only the hours I believe will have to be expended by NRAO engineers, does not include any estimate of time for electronics, control building layout, computer selection or site engineering. It does not include an estimate for hours for any items which I think might be sub-contracted. While this estimate may not be entirely accurate it should serve as a warning and perhaps will lead to a more accurate estimate and a more aggressive address to those tasks which must be performed.

ESTIMATE OF AUI ENGINEERING HOURS - 25 METER ANTENNA
TO BE PERFORMED 1980

(A)	Drives, Gearboy Gear Analysis	
	Drive Analysis (El. & Az.)	140 hours
	Engineering Concept (Component Selection, Prel. Des.) (Including configurations)	120 hours
	Concept & Control Drawings - Pre. Specs. 8 @ 40 hours	320 hours
(B)	Servo Design	
	System Analysis & Selection	200 hours
	Engineering Design & Component Selection (Prelim.)	160 hours
	Concept & Control Drawings 6 @ 40 hours	240 hours
	Prep. of Specs. for Design Contract	120 hours

(C)	Foundation	
	Specifications for Fndn. Investigation	120 hours
	Data Review & Contr. Supervision	150 hours
	Preliminary Foundation Design	120 hours
(D)	Review of Truck Designs Engr. Analysis	100 hours
	Concept Drawings 3 @ 40 hours	120 hours
	Rail Analysis and Control Specification	80 hours
(E)	Az. Bearing, Prelim. Design & Layout	80 hours
	Control Dwg. & Spec. (Prelim.)	40 hours
	El. Brg. Review & Layout	80 hours
(F)	Determination of Wind Parameters	
	Measurement of wind forces vs. Wind velocity in dome	120 hours
	Review of impact on astrodome & antenna	200 hours
	Meetings, discussions, resolutions	80 hours
(G)	Astrodome	
	Design Review	160 hours
	Drive designs preliminary	120 hours
	Concept drawings 6 @ 50 hours	300 hours
	Specification Preparation	240 hours
(H)	Position Reference System	
	Preparation of Error Budget	80 hours
	Pre. Design of Position System	360 hours
	Concept Drawings 6 @ 60 hours	360 hours
(J)	Structural Analysis - Antenna	
	Engr. Analysis	160 hours
	Joint Design	80 hours
	Concept & Layout Drawings 4 @ 60 hours	240 hours
	Specification Preparation	300 hours
(K)	Panel Review - Engr. Analysis	100 hours
	Concept Drawings - 4 @ 40 hours	160 hours
(L)	Surface Plate Adjustment	
	Engineering Designs - Pentaprism System	200 hours
	Specifications for procurement	80 hours
	Concept Drawings 2 @ 60 hours	120 hours
	Final Design - Stepping System	500 hours
	Detail Drawings - hardware 4 @ 60 hours	240 hours
	Engineering of Laser Ranger	1500 hours
	Assembly & Test - Laser Ranger	450 hours

(M)	Surface Plate Design	
	Study of Aeronutronic - Ford Plates	120 hours
	Review of possible alternate plates	300 hours
	Design of surface plates	240 hours
	Drawings 6 @ 50 hours	300 hours
	Preparation of contract specifications	200 hours
(N)	Focusing Feed Mount Engr.	120 hours
	Layout & Concept Dwgs. 3 @ 60 hours	180 hours
(O)	Vertex Cabin & Feed Layout	120 hours
(P)	Cabling & Walkways	80 hours
(Q)	Crane Access & Component Handling	120 hours
(R)	Estimate of Costs & Review	200 hours
	Total Hours	10380

There are several elements of the work to be performed this year for which sub-contracts either should be issued or could be issued as the results of that work are needed or would be beneficial to the completion of the design work. I am sure you are aware of them but will list them along with an estimate of funds needed to carry out the work.

(1) Foundation investigation at the selected site which I understand we have quotes for in the amount of $100k. This amount seems high to me but if it includes extensive labratory reports, recommendations, analysis and any design work may be correct.

(2) It may be advisable to have further tests of the AF plate made or to have a sample panel made or procured for a promising alternate method which might become apparent from a last review of the Harris panels, the British panels or a possible hybrid panel. About $35k should be available for use should this work seem advisable.

(3) Since it has been some 8 or 9 years since a servo design was done it would be advisable to have a qualified servo design firm, using information prepared in (B) above, prepare a servo design. We are asking a lot from the servo and it might be well to assure ourselves that there are no problems which would impact the position system or antenna design before we start final design on those features. An amount of approximately $45k will be needed.

(4) Development of a position reference system if work performed in (H) above confirms my belief that a position indication system will not get the job done. I have not reviewed Otto's position reference design (done in 1971) but feel sure it would need updating and think it probably would be inadvisable to wait until 1981 to start this work. A possible expenditure of around $50k should be planned for this work.

I have no doubt that the above sums will be quite difficult for NRAO to squeeze out of their present operating funds (maybe impossible) but if so I think we should appraise very carefully the impact of postponing any of these items into 1981. There are of course other expensitures to be made such as travel, some equipment for surface plate measurement tests, some materials for surface plate measurement stands which I have not attempted to estimate.