

**Baseline Change Proposals** (numerical order does not indicate ranking or preference)

Potential Savings (US\$2000\$)				Science Impact?	Approved Savings	
					17,009	
1	Reduction to 50 antennas	Included in Cost	MA	✓	na	Recovery costs (Antenna, FE, BE, Comp, SEI) included
2	Construct only up to 4km ALMA	12,603	MA	✓	Rejected	Defer long baselines (beyond ~4km); less road construction, lower number of pads 175 to 151, less fiber, power infrastructure
3	OSF residence	5,223	PR		1,825	Build pre-designed residence alongside existing infrastructure; reduce concept scope; early construction;
4a	Miscellaneous Site	5,527	RE		5,527	Recovery costs: 216 to 175 foundations
4b	Miscellaneous Site	996	RE		996	remove high site Hanger for antennas
4c	Miscellaneous Site	473	RE		Rejected	remove video surveillance
4d	Miscellaneous Site	445	RE		445	implement overhead power lines & communications;
4e	Miscellaneous Site	837	RE		837	remove 20% furniture costs across site
4f	Miscellaneous Site	1,175	RE		1,175	Delete sports facility/pool from Residence
4g	Miscellaneous Site	744	RE		744	Purchase road maintenance equipment instead of rental
5	WVR production	4,612	PR	✓	Rejected	Defer production run for WVRs (units 9-50) (note: should not be selected if BCP #2 is declined)
6a	FE support hardware	708	PR	✓	Rejected	(a) Defer solar filters (units 1-50)
6b	FE support hardware	200	PR	✓	Rejected	(c) Remove 1/4 wave plate for Band 7 (units 1-50)
7a	Back End descopes	6,109	MA	✓	Rejected	(a) Defer one IF DTS
7b	Back End descopes	887	PR	✓	887	(b) Remove two (of four) subarrays (exclude if 7c is selected)
7c	Back End descopes	1,016	MA	✓	Rejected	(c) Use AM LO scheme (exclude if 7b is selected)
7d	Back End descopes	572	MA	✓	Rejected	(d) Remove EDFA from DTS (serious technical objections and risks)
8	Front End Bands	17,560	MA	✓	Rejected	Defer receiving bands production runs units 9-50 for (a) Band 6 \$4.4M, (b) Band 7 \$5.4M, (c) Band 9 \$7.6M;
9	Front End Polarization	3,000	MA	✓	Rejected	Defer one polarization in FE receivers units 9-50 (est. \$1-1.5M per band, three bands?)
10	Software Descope	8,157	PR/MA	✓	Rejected	Defer 20% of computing deliverables including: 1. No dynamic scheduling; 2. No science pipeline; 3. No observatory support software (e.g., TAC support); 4. Little VO support, only simple science archive queries; 5. No easy-to-use mode in observing tool; 6. Very limited simulation; 7. Little commissioning against the real system
11	Travel	4,417			4,417	Lower travel budgets across project by ~20%; add 200K for videoconferencing / net meetings
12	Site Characterization	156			156	Eliminate Site Characterization 2006 and 2007

## BCP Details

2005-Sep-06

1000's of  
Y2K US\$

<b>2</b>	<b>Construct only up to 4km ALMA</b>	<b>12,603</b>	<b>MA</b>	Defer long baselines (beyond ~4km); less road construction, lower number of pads 175 to 151, less fiber, power infrastructure
		12,603		Construct only 4 km ALMA. See file ALMA_Configuration_Options_2005sep02.xls for detailed analysis of Array Configuration options
				Reduced savings for Combine Trench Power and FO cables already included in this option
<b>3</b>	<b>OSF residence</b>	<b>5,223</b>	<b>PR</b>	Build pre-designed residence alongside existing infrastructure; reduce concept scope; early construction;
		1,831		Early Residence construction
		684		Reduction in design and engineering costs (75% of D&E for Residence & VC)
		7,538		Current estimate for OSF Residence construction (3900 m^2)
		-4,989		Estimated cost of Pre Designed Residence (in 2005, informal \$3.5M, assume \$5M+20% contingency)
		159		Delete bridge (build near existing site)
<b>4</b>	<b>Miscellaneous Site</b>	<b>10,198</b>	<b>RE</b>	Recovery costs: 216 to 175 foundations
<b>4a</b>		5,527		50 Antenna / 175 pads / 18 km as detailed in file ALMA_Configuration_Options_2005sep02.xls
<b>4b</b>		996		Delete Hangar at AOS
<b>4c</b>		473		Delete Surveillance System
<b>4d</b>		445		Use above ground power lines instead of trench from OSF to AOS
<b>4e</b>		837		Reduce Furniture & Fixtures by 20%
<b>4f</b>		1,175		Delete Sports Facility / pool from Residence
<b>4g</b>		744		Purchase road maintenance equipment instead of rental
<b>5</b>	<b>WVR production</b>	<b>4,612</b>	<b>PR</b>	Defer production run for WVRs (units 9-50) (note: should not be selected if BCP #2 is declined)
		4,612		Defer production for WVR units 9-50 (but complete design) Savings correspond to 84% of basic production costs, including contingency. Note: this BCP should not be selected if BCP #2 is declined (i.e. long baselines will only work if WVRs are available).
<b>6</b>	<b>FE support hardware</b>	<b>908</b>	<b>PR</b>	
<b>6a</b>		758		Defer Solar Filters (Work Element 0980)
<b>6a</b>		-50		Engineering effort still required (as per Jan2005 FE descope options) to insure widget space available, mounting provision for future use
<b>6b</b>		200		Remove 1/4 wave plate for Band 7 (Jan 2005 ROM was 250K savings for 64 units)
<b>7</b>	<b>Back End descopes</b>		<b>MA</b>	(c) Use AM LO scheme (exclude if 7b is selected)
<b>7a</b>		6,109		Option 4: Remove one IF from each antenna.

<b>7b</b>	887		Option 3: Keep LO Photonics but remove subarrays (excluded if option 2 is selected)
<b>7c</b>	1,681		Option 2: Replace current LO Photonics Reference design with an AM reference frequency reference
<b>7c</b>	-665		Option 2: Additional costs for AM reference system (ROM estimate in 600-800K, use 800K in Year 2005)
<b>7d</b>	572		Option 1: Remove EDFA from DTS (serious technical objections and risks)
<b>8 Front End Bands</b>	<b>17,560</b>	<b>MA</b>	Defer receiving bands production runs units 9-50 for (a) Band 6 \$4.4M, (b) Band 7 \$5.4M, (c) Band 9 \$7.6M;
	4,481		Band 6 production costs, units 9-50, from Work Elements 0626, 1247, 1249, 1286, 1326, 1336. Scaling in V31 yielded ~\$4.7M using older estimates
	5,464		Band 7 production costs, units 9-50, from Work Element 1017
	7,615		Band 9 production costs, units 9-50, from Work Element 1019
<b>9 Front End Polarization</b>	<b>3,000</b>	<b>MA</b>	Defer one polarization in FE receivers units 9-50 (est. \$1-1.5M per band, three bands?)
	1,000		Band 6 J Webber confirmed ROM of 1 to 1.5M per band, 64 units. Only 3 bands eligible (fixed price contract in place for Band 3), 50 units + spares
	1,000		Band 7
	1,000		Band 9
<b>10 Software Descope</b>	<b>8,157</b>	<b>PR/MA</b>	Defer 20% of computing deliverables (unspecified components) (travel counted separately below, hardware included)
			1. No dynamic scheduling
			2. No science pipeline
			3. No observatory support software (e.g., TAC support)
			4. Little VO support, only simple science archive queries
			5. No easy-to-use mode in observing tool
			6. Very limited simulation
			7. Little commissioning against the real system
			In brief, rather than an E2E system we would have something much like the current VLA in terms of software capabilities.
	4,680		20% of Computing IPT Labor
	2,491		20% of Computing IPT Materials (Hardware and contracts)
	985		20% of Contingency on Labor and Materials
	0		20% of Travel (already included below)
<b>11 Travel</b>	<b>4,417</b>		Lower travel budgets across project by ~20%; add 200K for videoconferencing / net meetings
	4,600		~20% of Global Travel Budget
	-33		Desktop video hardware, 100 users 0.4K each in 2005
	-150		Internet meeting services, \$2.5K/month in 2005, 72 months
<b>12 Site Characterization</b>	<b>156</b>		Eliminate Site Characterization for 2006 and 2007. Funds already expended for equipment; savings derive from labor and travel reductions only