

AURA-OBSERVATORY & NOAO-SOUTH FACILITIES

SITE FINANCIAL REPORT

YEAR-END RESULTS for FISCAL YEAR 2012
and
PROJECTED BUDGET for FISCAL YEAR 2013



I. Introduction:

This report addresses the costs and revenues related to the operation and maintenance of the AURA Observatory sites in Chile as carried out by the Facilities and Operations department of the National Optical Astronomy Observatory during FY-2012. The detailed financial results are reported as well as the major events and developments that impacted operational logistics and costs. This report also includes a summary of the projected budget for FY-2013 and the basis for the fees that provide the revenue to support operational and maintenance services. Status and performance of networking infrastructure for AURA Observatory and NOAO South as well as improvement projects related to networking connectivity are described as well.

II. Executive Summary of Financial Results and Budgeting:

The NOAO-S Facilities and Operations budget for each fiscal year is based primarily on the previous year's budget and other long-term experiential data regarding costs for goods and services in Chile. An adjustment for inflation is made each year, along with discretionary corrective adjustments to the budgets for the specific services and the fees charged to the programs to cover the cost of those services. For all administrative and operational activities in Chile, direct accounting is in Chilean Pesos (CLP). Correspondingly, the budget and all monetary figures in this report are in CLP.

The FY-2012 budget for NOAO-S Facilities was **\$1,782,228,072** CLP, 4% higher than that of the previous year. That budget proved to be an underestimate of actual costs, as total NOAO-S Facilities expenses in FY-2012 were **\$1,880,617,740**, approximately 5.5% over the budget. This deficit was covered, however, by higher than anticipated revenues from Per-Use Fees. The total FY-2012 revenue from Per-Use Fees, Share Fees, and Census Fees was **\$1,621,605,915** which when applied to the total expenses of **\$1,559,567,900** (excluding General & Administrative costs, which are accounted for separately), resulted in a surplus of **\$62,038,015**.

The NOAO-South Facilities budget for FY-2013 is **\$1,359,271,403**. The reduction from the FY-2012 is due to the fact that the common administrative services (warehouse, shipping & receiving, inventory control, accounting, general administration and human resources) were all removed from the facilities budget and restructured into a central AURA-based administrative department. The All-Staff Census Fee was reduced by 60% in FY-2013 to reflect the removal of those services and their reimbursement by other means. For the services that remained within NOAO-Facilities, there was an increase of 5% over the FY-2012 budget. This is essentially an inflationary adjustment consistent with the Chilean inflationary index (IPC) for that period and salary increases in accordance with the collective bargaining agreement. Section V of this report contains additional detail on the FY-2013 budget.

III. FY-2012 Developments and Events:

The following significant developments and events occurred during FY-2012, which impacted NOAO-S Facilities & Operations:

- Final planning was developed for NOAO-South Facilities to become a separate entity from AURA Administration. This reorganization, which went into effect at the beginning of FY-2013, is part of an overall consolidation of the AURA support departments that serve all the NSF-funded astronomical centers and programs that are managed by AURA. The separation of NOAO-South Facilities from Administration has been largely transparent from an operational standpoint, as all of the established procedures for providing services have continued as in past years. The related changes in accounting procedures, and in some cases personnel, resulted in some cost-tracking anomalies in NOAO Facilities accounts in FY-2012 which are described in Section III.
- There was a necessary reduction in force throughout NOAO in April, 2012 which created unanticipated variances in work assignments and costs in the departments from which persons were laid off or redeployed to cover the departing personnel. Necessary maintenance and repair tasks were contracted out or handled provisionally by other staff members until the necessary support positions could be rehired in FY-2013.

- Facilities provided support of DECam installation and commissioning on Tololo throughout the year, including increased demand for lodging and meals, and start-up of a new chiller at the Blanco telescope.
- Gemini start-up and commissioning of the MCAO system required additional on-site support services.
- Initiation and substantial completion was achieved on a project to replace the primary water supply piping that serves Cerro Tololo and Cerro Pachón – primarily the main piping from the well in Quebrada San Carlos to Tololo. Related upgrades of pumping stations and other infrastructure were also undertaken and completed as part of that project.
- The main Pachón transformer failed in December of 2011, requiring complete replacement. The Pachón facilities were all run on generator power for approximately 50 days while the new transformer was fabricated and installed.
- A new main back-up generator on Tololo was commissioned and put into service.
- There was a work-related accident in February in which the f-8 mirror for Blanco fell off of a handling cart and struck two technicians. Operations involvement included immediate EMT response, participation in safety investigation, and increased commitment of Tololo Nurses and NOAO-S Safety Officer to oversight of telescope work.
- There was a work-related accident in June where a rock dislodged by an electrical line worker rolled down hill striking and breaking the leg of a water line worker. Operations involvement included immediate EMT response, participation in safety investigation, delay of water line and power line projects as well as subsequent increased vigilance and coordination of work by separate contractors.
- There were 4 road accidents and incidents requiring follow-up investigation and in some cases repair work to AURA vehicles.
- The new dining facility at Cerro Pachón was completed, outfitted, and put into service. First meal service was on June 4.
- There were multiple breakdowns of the mountain bus in the final year of the 5-year contract with Verschae Ltda. Major repairs, including replacement of the engine, required extended periods of replacement bus service as well as extensive communication and coordination with Verschae and the users of the bus.
- The building and dome for PROMPT 7 telescope was completed. The telescope was installed in October.
- LCOGTN Telescopes on Tololo were installed and tested on-site during May and June. Commissioning continued remotely, and first light was obtained in October 2012
- Construction of the KMTNet (KASI) telescope facility was contracted. Work was initiated on site in May and continued through the year.
- Upgrades to the ALO facility on Pachón were contracted and completed in July.
- Inadequacy of the electrical power capacity in Pachón hotel/ALO area became critical following start-up of the new dining/kitchen facility and upgrades to ALO laser.
- Major renovation projects for all 3 dormitory buildings at Tololo were contracted. Work at the dorms was initiated in May and was 80% done by end of the FY-2012. This project necessitated relocation of workers lodging in the dorms and imposed temporary limited availability of overnight accommodations on Tololo.
- On-site progress of LSST project was put on hold following completion of initial site leveling and road preparation.
- A relatively mild winter resulted in minimal need for repair of roads, power lines and other infrastructure.
- Underground fuel storage tanks in La Serena Recinto and on Cerro Tololo were decommissioned.
- Substantial completion was achieved on a remodeling project to convert a section of the existing La Serena library into a staff interaction space and a meeting/dining area.
- The University of La Serena installed a new gate at the base of their property replacing the AURA-owned gate and imposing new protocols and schedules for use of this Raul Bitran gate. This measure further exposes AURA to unpredictable and increasingly restricted access and advocates for the development of a new access point in the near future.

IV. FY-2012 Financial Results:

A. Mountain Cost Centers:

Mountain cost centers include all of the expenses for operation and maintenance of the facilities on Tololo and Pachón. These are divided into two basic categories for tracking and recovery of costs:

Share-Fee accounts cover the support services that cannot be directly tracked and billed to the individual programs, and therefore are instead billed as comprehensive fees calculated separately for Pachón and Tololo. This includes safety/security services, road and power line maintenance, power generation and communications networking services. For Share-fee services in FY-2012 there was a total expenditure of \$316,057,802 versus a budgeted amount of \$368,112,128. This underspend was due to several factors. A mild winter resulted in lower than normal burden for road and power line maintenance, and a significant percentage of the equipment operators time was dedicated to preparation of the road and parking area for the new Pachón dining facility – a project which was capitalized by ARRA funding.

Per-Use accounts cover the expenses that can be directly tracked and charged based on consumption by the programs. These include dining services (per meal), dormitory use (per room-night), janitorial services (per hour) and water supply (per cubic meter). For Mountain Per-use services in FY-2012 the total expenditure was \$545,451,446 versus a budgeted amount of \$541,828,554. Total revenues from billing for these mountain-based Per-use services were \$662,672,747, generating a surplus of 21% over the expenditures. This higher than anticipated revenue was due in large part to the demand for lodging and meals generated by the DECam installation, Gemini MCAO commissioning and other project activities on both Tololo and Pachón.

B. La Serena and General Cost Centers:

La Serena and General cost centers include all of the expenses for operation and maintenance of the base facilities on the AURA Recinto in La Serena and general costs such as safety and transportation. Similar to the Mountain, these are divided into two basic categories for tracking and recovery of costs.

Census-Fee accounts, based proportionately on the number of employees each program has in Chile, cover services that cannot effectively be tracked directly based on use by the programs. This includes safety services, security (Recinto guard) service, warehouse/inventory services, communications maintenance, personnel and payroll. For Census-Fee services in FY-2012 there was a total expenditure of \$447,619,874 versus a budgeted amount of \$362,333,577. This overrun resulted in large part because the reduction in staff in 2012 included two retirements of long-term employees resulting in *finiquito* (retirement severance) payments distributed over the General Operations cost centers. Several other significant identifiable factors are noted in footnotes to Table 1. Despite the overrun, the revenues from Census fees were \$430,418,539 which covered 96% of the expenditures.

Per-Use accounts cover the base facility expenses that can be tracked directly based on consumption. These include water and sewer (per cubic meter), vehicle and building maintenance (per hour), transportation (per trip) and hotel (per room-night). For La Serena Per-Use services in FY-2012 the total expenditure was \$250,438,778 versus a budgeted amount of \$171,766,934. These accounts, as with the Census-fee accounts, were affected by the *finiquito* payments and several other factors for specific accounts which are noted in Table 1. Total revenues from billing for these La Serena-based Per-Use services were \$209,157,832 covering 84% of the expenditures.

C. General and Administrative (G&A) Expenses:

This category covers general support, administration and accounting expenses related to facilities maintenance and operation in Chile. For the most part these are payroll expenses for personnel carrying out management, administration, accounting, purchasing, reception and IT support. The total FY-2011 G&A expenditure was \$321,049,840 versus a total budget of \$338,186,878.

Table 1 details the actual FY-2012 expenses in all cost centers and their assigned budgets for FY-2012 & FY-2013.

Table 1 – FY-2012 Budget vs. Actual Expenses and FY-2013 Budget

Description of Service	FY2012 Budget (CLP)	FY2012 Actual (CLP)	FY2013 Budget (CLP)
MOUNTAIN SHARE-FEE ACCOUNTS			
Security	23,364,188	24,541,499	36,405,278
Visitor Center	11,616,364	11,838,569	12,161,693
Emergency Medical Services	153,552,545	147,639,317	141,861,911
Road Maintenance Gate-Quisco	49,062,618	31,687,792	64,390,662
Road Maintenance Tololo-Quisco	4,926,568	3,638,765	5,519,730
Road Maintenance Pachón-Quisco	16,943,600	2,486,650	8,691,867
Power Line Maintenance Gate-San Carlos	37,445,672	34,820,429 ¹	26,183,064
Power Line Maintenance San Carlos - Tololo	9,417,100	1,910,726 ¹	13,005,628
Power Line Maintenance San Carlos - Pachón	25,183,729	18,263,638 ¹	26,163,827
Communications-Tel. Radio Maintenance	28,384,236	30,993,571	31,280,904
Power Generation	8,215,508	8,236,847	19,783,069 ²
TOTAL for MOUNTAIN SHARE FEE ACCOUNTS	368,112,128	316,057,802	385,447,632
MOUNTAIN PER-USE ACCOUNTS			
Janitorial Services (Mountain)	40,136,326	32,123,272	45,950,212
Kitchen Operations Tololo	183,266,540	197,540,112	201,299,343
Kitchen Operations Pachón	177,557,500	176,990,839	191,156,067
Dormitory Operations Tololo	71,706,843	71,832,401	80,368,759
Dormitory Operations Pachón	54,608,829	40,625,264	61,526,319
Water Supply	14,552,516	26,339,558 ³	15,986,057
Water Transport	2,010,881 ⁴	8,677,160 ⁴	2,216,250 ⁴
TOTAL for MOUNTAIN PER USE ACCOUNTS	541,828,554	545,451,446	598,503,007
LA SERENA and GENERAL CENSUS-FEE ACCOUNTS			
Safety	25,033,625	17,768,275	32,398,765
Reception	Previously a Logistics and Admin. allocation		48,492,411
Warehouse/Shipping & Receiving	85,229,064	125,956,326 ⁵	Moved to CAS
Garage and Transport (operations vehicles)	47,761,103	59,329,999	49,082,898
Inventory Control	10,608,420	27,196,437 ⁶	Moved to CAS
Communication & Telephone Maintenance	10,559,632	11,432,867	13,409,852
Security La Serena	59,558,337	69,387,105	70,376,134
Personnel and Payroll	123,583,396	136,548,865	Moved to CAS
TOTAL for LA SERENA CENSUS FEE ACCOUNTS	362,333,577	447,619,874	213,760,061
LA SERENA PER-USE ACCOUNTS			
Water & Sewer	20,123,683	24,257,867	25,554,506
Garage & Transport (program vehicles)	5,896,975 ⁷	1,774,518 ⁷	21,035,528 ⁷
Maintenance Group	51,707,444	81,942,700	76,738,047
Shuttle Transportation (Carryall)	32,083,789	73,873,409 ⁸	41,000,889
Janitorial Services (La Serena)	31,246,501	25,227,193	27,753,564
LS Hotel	30,708,542	43,363,091	41,764,139
TOTAL for LA SERENA PER USE ACCOUNTS	171,766,934	250,438,778	233,846,672
GENERAL and ADMINISTRATIVE			
General Administration	213,040,302	171,428,645	Moved to CAS
Budget & Accounting	125,146,576	149,621,195	Moved to CAS
Total G&A Expenses	338,186,878	321,049,840	
Grand Total	1,782,228,072	1,880,617,740	1,431,557,371

Notes for Table 1

¹ Power Line Maintenance costs were lower than anticipated due to the layoff of the mountain electrician in April and the deferral of necessary work until the position could be refilled in FY-2013. Also notable in the table is that the half year of wages were not properly distributed over the three sectors of the power line. This accounting practice was corrected in FY-2013.

² 2013 budget for Power Generation included an erroneously high factor in the cost model. This will be corrected in the budget for 2014 and future years.

³ Cost for Water Supply was increased by non-recurrent expenditures for a new deep-well pump and a water level sensor for the Pachón tank, improvements which were most efficiently done concurrently with the ARRA-funded water line renovation.

⁴ Budget for Water Transport in 2012 and 2013 did not include labor for the truck driver, which was instead budgeted in the driver's home road maintenance account but were charged, appropriately, to Water Transport. This will be corrected in the budget for 2014 and future years.

⁵ Higher than expected Warehouse costs were due in part to the restocking of common use materials being charged to the Warehouse where they are purchased, stored and dispensed, rather than to the Operations departments that use them. This practice has been corrected.

⁶ Cost for Inventory Control increased as the Property Manager became a full time position in 2012, instead of a shared position with a portion of time charged to Purchasing.

⁷ Garage and transport per-use has a high degree of fluctuation due to chronic unpredictability of demand and cost. A different method of funding necessary garage work is under consideration, which would charge them more directly to the services and programs that utilize the vehicles.

⁸ Some payments for bus service were erroneously charged to shuttle account, later corrected and charged appropriately.

D. Consumption of Per-Use Services:

Determination of the budget for each fiscal year includes the review of the quantities (Qs) of Per-Use services that were used in the previous year as a means to predict the Qs that are expected to be billed to the user programs in the coming year.

Table 2 shows the budgeted and actual Qs for FY-2012 and the percentage that they were over or under the estimated (budgeted) amount.

Table 2 – Predicted and Actual Consumption of Per-Use Services in FY-2012

<u>Mountain Per -Use Service</u>	Quantity	FY-2012	FY-2012	% Over/Under
	(Q)	Budget Qs	Actual Qs	Budget
Janitorial Services (Mountain)	hours	3,015	3,066	2%
Kitchen Operations Tololo	meals	17,013	18,509	9%
Kitchen Operations Pachón	meals	15,587	18,432	18%
Dormitory Operations Tololo	room-nights	5,965	6,414	8%
Dormitory Operations Pachón	room-nights	2,096	2,762	32%
Water Supply	cubic meters	2,942	2,928	0%
Water Transportation	cubic meters	1,242	703	-43%
<u>La Serena Per-Use Service</u>	Quantity	FY-2012	FY-2012	% Over/Under
	(Q)	Budget Qs	Actual Qs	Budget
Water & Sewer	cubic meters	21,871	18,806	-14%
Garage	hours	1,180	2,498	315%
Building Maintenance	hours	3,895	3,480	-11%
Shuttle (Carryall) Transportation	one-way trips	774	625	-19%
Janitorial Services (La Serena)	hours	2,899	2,855	-2%
La Serena Recinto Hotel	room-nights	1,000	1,037	4%

E. Overall Balance of Revenues and Expenses:

A summary of the FY-2012 financial results by category of expense is shown in Table 3. The most notable surplus was in the Mountain Per-Use accounts, due mainly to revenue generated by high volume of Qs for meals and lodging services at the mountain sites. The most notable deficit was in the La Serena Per-Use accounts for which the Qs (except for Garage hours) were all at or significantly below the predicted levels. The bottom line of Table 3 shows that a net overall surplus of \$62,038,015 was generated. That surplus was retained within the Operations accounts to which the services are charged and will be utilized, at the discretion of the NOAO-South Director, for infrastructure improvements that benefit all the served programs.¹

Table 3 Summary of 2012 Financial Report by Type of Account

NOAO-S A&F Financial Report – FY-2012				
TYPE OF ACCOUNT	REVENUES	EXPENSES	(SURPLUS)/DEFICIT	% contribution to the overall total surplus
SHARE-FEE ACCOUNTS	(319,356,798)	316,057,802	(3,298,995)	5%
CENSUS-FEE ACCOUNTS	(430,418,539)	447,619,874	17,201,335	-28%
MOUNTAIN PER-USE ACCOUNTS	(662,672,747)	545,451,446	(117,221,301)	189%
LA SERENA PER-USE ACCOUNTS	(209,157,832)	250,438,778	41,280,947	-67%
Totals for FY-2012	(1,621,605,915)	1,559,567,900	(62,038,015)	100%

V. FY-2013 Budget:

The FY-2013 budget, following the precedent of previous years, has been developed with a zero-sum approach, wherein the established fee structure for each cost center is adjusted so as to generate revenues as close as possible to the expenses that are anticipated to be incurred for each given support service during the coming fiscal year. Services are assumed to be provided under normal circumstances, however, the fees are set at a level to cover a limited amount of additional unpredictable expenses such as emergencies and extreme weather. In any given fiscal year surpluses in the accounts for any of the services are applied to deficits incurred due to unexpected costs in other services. Any unforeseen major expenses that exceed overall revenues for all service-related accounts will necessarily be billed separately and proportionately to the programs utilizing the affected services.

The development of this budget employs a detailed cost model which incorporates predicted expenses for each cost center derived from historical accounting records and other relevant statistical information. An inflation of 5.0 % was assumed, consistent with the Chilean IPC for the period and salary increases in accordance with the collective bargaining agreement. It was assumed that operational activities in FY-2013 will be resourced and performed in a similar manner to FY-2012 and previous years.

Based on the FY-2013 budget projections presented previously in Table 1, fees and rates for services to be charged in FY-2013 were determined. These rates are listed in Table 4 along with the previous FY-2012 rates and the variation (+/-) between the two. These rates are developed following the criteria of Full Cost Recovery as mandated by the United States Office of Management and Budget.

¹ The principal use for the surplus generated in 2012 was the purchase of a water truck. Having this new vehicle, with a larger tank and dedicated exclusively to water delivery, allows faster more sanitary filling of the Pachón tank affording an important safety and efficiency improvement for road maintenance, as the dump truck no longer has to be outfitted to haul water every two weeks.

Table 4 – FY-2012 and FY-2013 Fees and Rates for Services:

Type of Fee		FY-2012	FY-2013	Variation
2-m Share Fees:				
Tololo	Per-share	80,297,296	81,903,242	+2%
Pachón	Per-share	83,686,459	85,360,188	+2%
Census Fees:				
La Serena Based employee/year	Per-employee	579,850	608,843	+5%
All Places All staff Census employee/year	Per-employee	1,692,311	676,294	-60%
Per-use Rates (Mountain):				
Water – Tololo	Per cubic meter	6,791	7,131	+5%
Water - Delivered to Pachón	Per cubic meter	11,437	12,009	+5%
Tololo Meals	Per meal	10,312	10,828	+5%
Tololo Lodging	Per room-night	13,260	13,928	+5%
Pachón Meals	Per meal	10,312	10,828	+5%
Pachón Lodging	Per room-night	39,377	40,536	+3%
Janitorial Services	Per hour	10,209	10,719	+5%
Per-use Rates (La Serena):				
Shuttle Transportation Carry All	Per one-way ride	33,000	34,650	+5%
Garage	Per hour	5,971	6,270	+5%
Maintenance Group	Per hour	8,311	8,727	+5%
Janitorial Services	Per hour	12,280	12,894	+5%
Hotel	Per room night	28,840	30,282	+5%
Water and Sewage	Per cubic meter	926	1,019	+10%

Primary considerations reflected in the above schedule of fees and rates are:

- An overall increase, commensurate with IPC-based inflation, of 4.2% (+ 1% for labor) is generally included in the FY-2013 fees. This was applied to almost all fees as a 5% increase from FY-2012, with only a few exceptions, as noted below.
- The All-Staff Census fee was reduced by 60% to reflect the removal of the administrative overhead costs, which, as described previously, starting in FY-2013 are charged directly by AURA-CAS to the programs for their administrative and accounting services.
- An appropriate factor to account for AURA-CAS overhead charged to NOAO-South was applied for support of Facilities and Operations departments and personnel.
- Share fees were increased by 2%. This increase, although lower than inflation, was predicted by the cost model to cover the cost of the services funded by the share fee.
- Water and sewage fee was increased 10%. The cost model indicated the need for a 19% increase, but that was considered to be an overly precipitous adjustment to make between fiscal years.
- Pachón lodging increased overall 3%, as the 5% inflation factor was only applied to the operational expenses, not to the loan- service portion of the fee.
- The cost model was utilized to verify that the overall anticipated revenues would cover anticipated costs.

VI. Facility and Infrastructure Projects to be developed in FY-2013:

A number of NOAO-South Facilities projects will be completed, initiated or studied for feasibility and cost during FY-2013. These projects are described below in Table 5. The funding source for each project is also identified.

The first section of Table 5 lists projects which were funded through the American Recovery and Reinvestment Act (ARRA) along with the amount in U.S. dollars (USD) allocated for each project. The total ARRA allocation to NOAO South was \$2,758,475 USD, which included a 1.6% administrative and overhead cost to manage the projects.

The second section of Table 5 lists the projects that are funded or potentially funded by NOAO-South Operations accounts. The financial feasibility of these projects is largely dependent on the potential surplus generated from revenues that is not fully expended on regular maintenance and operations activities or otherwise required for response to emergencies or other unanticipated repairs.

The third section of Table 5 describes projects involving NOAO Facilities & Operations support which are in development or planning and are funded by other sources. These include support of projects for tenant telescopes – funded by other institutions – and projects that are capitalized by the users of specific services, such as maintenance projects for the rented housing in the La Serena Recinto.

Project	Funding Source	Status at End of FY-2012
American Recovery and Reinvestment Act (ARRA) [program or department receiving & managing project] Mountain		
Tololo/Pachón Water System Renovation	ARRA (\$400K USD) [NOAO Facilities & Operations]	Work in progress, Completion anticipated February 2013
Dormitories Repair and Renovation	ARRA (\$480K USD) [NOAO Facilities & Operations]	Work in progress Completion anticipated December 2012
New Pachón Dining Facility – Construction	ARRA (\$450K USD) [NOAO Facilities & Operations]	Complete and in use
4m (Blanco) Upgrade of Coudé Room and Handling for New Instruments	ARRA (\$100K USD) [CTIO Telescope Operations]	Complete and in use
4m (Blanco) Upgrade of Computer & Console Rooms for DECAM	ARRA (\$125K USD) [NOAO Facilities & Operations]	Complete and in use
4m (Blanco) Mirror Coating Chamber Improvements	ARRA (\$124K USD) [CTIO Telescope Operations]	80% complete, remainder of work pending next coating cycle
4m (Blanco) Entrance Protection	ARRA (\$20K USD)	Complete
4m (Blanco) Cooling System Upgrade	ARRA (\$35K USD) [CTIO Telescope Operations]	Complete, fully commissioned and tested for use
Cerro Tololo UPS Upgrade	ARRA (\$67K USD) [CTIO Telescope Operations]	Complete and in use
Mountain Electronic Lab Equip Renewal	ARRA (\$20K USD) [CTIO Telescope Operations]	Complete and in use
Pachón Dorm Emergency Generator	ARRA (\$60K USD) [NOAO Facilities & Operations]	Complete and in use

Mountain Meeting Rooms Renovation	ARRA (\$60K USD) [NOAO Facilities & Operations]	Complete and in use
Mountain Road Guardrail Installation (approved use of funds instead to replace Motor /Generator Frequency Converter)	ARRA (\$150K USD) [NOAO Facilities & Operations]	Frequency converter fully repaired and in use.
ARRA La Serena		
La Serena Machine Shop Modification & Refurbishment	ARRA (\$46K USD) [NOAO Engin. & Tech. Services]	Pending evaluation of priority, and potential overrun of other projects
La Serena Lab Equipment Renewal	ARRA (\$97K USD) [NOAO Engin. & Tech. Services]	Complete and in use
La Serena CNC Milling Machine	ARRA (\$80K USD) [NOAO Engin. & Tech. Services]	Complete and in use
La Serena OTDR Unit Replacement	ARRA (\$25.5K USD) [NOAO Engin. & Tech. Services]	Complete and in use
La Serena Compound Water System Renovation	ARRA (\$100K USD) [NOAO Facilities & Operations]	In Progress, Completion anticipated in July 2013
La Serena Meeting Rooms Renovation	ARRA (\$40K USD) [NOAO Facilities & Operations]	In progress, Completion anticipated in July 2013
La Serena Compound Security Fencing Repair	ARRA (\$40K USD) [NOAO Facilities & Operations]	Complete
Vehicle Fleet Renewal	ARRA (\$188K USD) [NOAO Facilities & Operations]	Complete
NOAO South Operations Accounts (Mountain)		
New Pachón dining facility – Outfitting and start-up	NOAO-S Operations	Complete and in use
Conversion of old Pachón dining facility to Mountain paramedics/nurses office	NOAO-S Operations	Evaluation/scoping in progress, requires purchase of building.
Interior finishes and outfitting of multi- purpose area in Pachón dining facility	NOAO-S Operations	Evaluation/scoping in progress
Complete construction and outfitting of a networking facility on Pachón	NOAO-S Operations	Building construction complete, final outfitting to be coordinated
Extend landfill on Tololo	NOAO-S Operations	Complete
Repair of Tololo water chlorination system	NOAO-S Operations	Preparatory maintenance in progress – replacement project pending
La Serena and Common		
Removal of fuel tanks on Tololo and in La Serena	NOAO-S Operations	Tanks decommissioned, pending removal by contract
Repair of La Serena office facility roofs	NOAO-S Operations	Bids received, evaluation of available funding in progress
Repainting of La Serena office, shop and warehouse buildings	NOAO-S Operations	Cost estimates received, evaluation of available funding in progress
Consolidation of Operations and AURA Services offices	NOAO-S Operations	In planning

Projects with Other Funding Sources (Mountain)		
Support of installation of PROMPT 7 telescope on Tololo	PROMPT Project	Complete and in operation
Support of installation of PROMPT 8 telescope on Tololo	PROMPT Project	Building construction bid, evaluation of proposals in progress
Support of installation of LCOGTN Telescopes on Tololo	LCOGTN Project	Complete and in operation
Support of facility construction for KMTN Telescope on Tololo	KASI (Korean Astronomical Agency)	Building construction 80% complete dome installation in progress.
Pachón transformer replacement	Proportional charge to programs using transformer	Fabrication and installation complete, transformer in use
ALO Improvements	ALO (University of Illinois)	Initiated and completed authorized part of project, remainder pending
(La Serena)		
Various, repairs, improvements and refurbishments to La Serena houses	Housing rent account	Scheduled throughout the year based on maintenance needs and housing turnover
Improvements to swimming pool facility	Pool user fee account	Authorized improvements completed, remainder pending funding
Repair to La Serena athletic court	TBD – contributions/fees from potential users	Work scope in study
Construction and implementation of a new gate into the La Serena Recinto	TBD	Potential locations being studied for feasibility. Communications with the University of La Serena and Municipal authorities in progress.

VII. AURA/NOAO-S NETWORKING REPORT

Introduction

The AURA network in Chile comprises of the following sections that are maintained by NOAO-South Computer Infrastructure Services South (CISS):

- Connectivity from La Serena to Cerro Tololo and Cerro Pachon which is served by a common backbone utilizing Microwave radios to produce two STM-1s or 310 Megabits per second (Mbs)
- Connectivity from La Serena to Santiago which is operated by REUNA, the Chilean Education and Research Network that provides 150Mbs. This is sub-divided into 120Mbs for research traffic and 30Mbs for commodity.
- Connectivity from Santiago to Miami which is operated by LAUREN and AMLIGHT who are funded by NSF grants and funds from Brazil which provide our 150Mbs
- From Miami onwards connectivity is provided by research networks in the U.S. such as I-2, NLR, ESNET, Atlantic Wave, Pacific Wave, CENIC and others.

• Status at End of FY-2012

- In the second semester of FY-2012 we increased our last mile and international bandwidth from 150 Mbs per to ~1000 Mbs (1 Gigabit per second). The last mile which is provided by REUNA had already provided the bandwidth increase expected on account of their partnership with ESO, and the provision of a 10 Gigabit Lambda from Santiago to Antofagasta. AURA had contributed to this link by providing Ciena DWDM ADM

equipment in La Serena and Copiapo which was a front-end payment for REUNA to build up their infrastructure..

- It had been anticipated that the increase was to have been a circuit from Santiago to Sao Paolo via terrestrial link, but as that had continued to be delayed, Amlight provided a 622Mbs circuit along the west coast of South America to Panama and Miami.
- During FY-2012 the AURA backbone from La Serena to the summits of Cerro Tololo and Cerro Pachon have undergone normal maintenance and minor problems on the radio links have been resolved using spares. None of this caused downtime on the circuit but only a decrease in capacity that did not adversely affect user traffic.

Detailed Performance

The graph in Figure 1 is provided by Ampath and shows the uptime for the circuit from the Santiago POP gateway router to AMPATH in Miami. The cause of typical outage was in main part fiber breaks and equipment failure along various parts of the circuit, notably Brazil where many changes have been made to improve the circuit.

State	Type / Reason	Time	% Total Time	% Known Time
UP	Unscheduled	356d 6h 28m 14s	97.341%	97.341%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	356d 6h 28m 14s	97.341%	97.341%
DOWN	Unscheduled	9d 17h 31m 46s	2.659%	2.659%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	9d 17h 31m 46s	2.659%	2.659%
UNREACHABLE	Unscheduled	0d 0h 0m 0s	0.000%	0.000%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	0d 0h 0m 0s	0.000%	0.000%
Undetermined	Nagios Not Running	0d 0h 0m 0s	0.000%	
	Insufficient Data	0d 0h 0m 0s	0.000%	
	Total	0d 0h 0m 0s	0.000%	
All	Total	366d 0h 0m 0s	100.000%	100.000%

Figure 1