



BUDGET FISCAL YEAR 2016
FACILITIES OPERATIONS
NOAO-S

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V3.2

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NOAO-S Facilities Operations

Executive Summary

In this report the fiscal year 2016 (FY2016) annual budget for the NOAO-S Facilities Operations Department (hereafter Facilities Operations) is discussed. Facilities Operations maintains the common infrastructure on the AURA recinto (including the recinto hotel) in La Serena and the AURA-Observatory near Vicuña, i.e. telescopes and facilities located on Cerros Tololo and Pachón. The total budget for FY2016 is 2220 MCLP or 3.7 MUSD at 600 CLP per USD. This includes the costs for several major infrastructure upgrade and improvement projects planned for FY2016, as well as certification of critical infrastructure to comply with Chilean health and safety regulations and training and certification of key personnel.

All costs to provide the services are recovered through charges to the users, i.e. the large programs, the other AURA-O tenants and visiting astronomers: mountain share, census and per-use charges. The charges are calculated yearly and are based on the costs for providing the services and a cost-sharing model (van der Blik & Heathcote 2014). Charges for the mountain share are calculated based on the “Two-Mountain Model”, census charges are based on the number of employees per program and per-use charges are based on the estimated usage of these services. The FY2016 charges are presented in the Tables 5 in this report.

The Mountain Share Charges for FY2016 have increased significantly in comparison with the FY2015 Mountain Shares. The largest component of this increase is the improvement and upgrade projects mentioned above, although IPC and salary increases also contribute to the increase.

In Section 4 we discuss the improvement and upgrade projects for FY2016 and we present the budget for these projects. All projects are related to critical maintenance, upgrades of equipment to allow for certification by Chilean authorities and the cost of these certifications. All of which should not be postponed any further. Training and certification of critical personnel is budgeted for under Mountain General Operations. The current favorable exchange rate for the USD to CLP is another reason to implement these projects in FY2016. In the document below we break out “Extra Projects” which are lower priority than the critical upgrades described in section 4. The 2220 MCLP total budget includes the “Extra Projects.” The baseline for the FY2016 budget is 2097 MCLP, comprising regular operating costs and FY2016 projects; the latter are all critical upgrade projects. This baseline budget compares to 1596 MCLP in FY15. Excluding critical upgrades, the base budget would be 1802 MCLP, see Table 1.

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Comments on the report

This document was revised to include comments from the NOAO Directors and the NOAO-S Facilities Operations Advisory Committee, including breaking out the budget for regular operations and the budget for improvements and upgrades.

In addition, instead of planning for execution of all proposed upgrade and improvement projects, it was agreed upon to postpone the projects listed as “Extra Projects” (Table 4) to FY2017. Those projects would have been financed through the “Extra Share Charge” in Table 5. The FY2016 share charges are listed in Table 6, and are the sum of the “FY2016 Base Share Charge” and the “FY2016 Projects Share Charge”.

Finally, an outlook for the budget for the coming years will be presented as well, albeit in a separate report. This is particularly relevant because for the last few years the NOAO-S Facilities Operations department has been committed to improve operations, to provide better service and to increase the control and transparency of the departmental finances and these improvements did come at a cost. In the coming two years, we plan to complete the improvement and upgrade projects, and the expectation is that by the end of FY2017 we will have a regular, vigorous maintenance plan back in place, which will include periodic upgrades and renewal of equipment. It is therefore timely to present an outlook for the coming years, both in terms of planning and in terms of budget.

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1. Introduction

The NOAO-S Facilities Operations Department (Facilities Operations) maintains the common infrastructure for AURA-O and the programs and smaller tenants present on the AURA-O properties, in La Serena and near Vicuña. This includes road maintenance, maintenance of the common electric power systems, water and wastewater systems and the communication system. Facilities Operations also manages the restaurant and hotel facilities on the two mountaintops as well as the hotel service on the La Serena recinto. Finally, the Facilities Operations department oversees the guard service, reception and the transportations services. A detailed description of the services provided or supervised by the Facilities Operations department can be found in the Service Level Agreement July 22, 2014. Included in the services, but under direction of the NOAO-S safety engineer, is the emergency medical service. The description of this service is not yet included in the Service Level Agreement, pending a reorganization of this service.

The department operations costs are fully recovered through charges to the programs and visiting astronomers. The charges for the services are calculated annually on the basis of the yearly budget and a cost-sharing model agreed upon by the programs. Departmental overhead is distributed over the cost centers in terms of percentage of the budget per cost center. Services provided internally, to other groups within the NOAO-S Facilities Operations Department, are charged an internal rate to avoid double charging of overhead in the cost center using the service. Indirect costs associated with the NOAO Director's Office and Business Administration charged to NOAO by AURA CAS and AURA HR are added to direct costs at a rate of 5.5%. These 5.5% represent the "All-sites" portion of NOAO General and Administrative (G&A) rate charged to externally funded projects. All NOAO rates are developed with the assistance of AURA-CAS and submitted to NSF for approval on an annual basis.

The budget is primarily based 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 specific services. For FY2016 we assumed an inflation of 4%. Planned improvement and upgrade projects are also included in the budget. For all administrative and operational activities in Chile, direct accounting is in Chilean Pesos (CLP). Correspondingly, all monetary figures in this report are in CLP and, charges for the services are calculated and charged in CLP.

2. The FY2016 plan & FY2016 budget

The FY2016 budget is presented in Table 1. This totals 2220 MCLP, covering all cost centers, departmental overhead and the AURA Business Service Charges (accounting, procurement, HR, AURA indirects) and it includes the budget for four "extra" improvement projects (123MCLP). The baseline budget of 2097 MCLP comprises regular operations: 1802 MCLP and FY2016 improvement and upgrade projects: 295 MCLP. The budget for regular operations was 1596 MCLP in FY15.

There are some notable increases in the regular operations budget compared to FY2015. The budget for "Payroll and Fringe Benefits Expenses" increased by about 16%. This increase is partly due to the collective bargaining agreement and merit increases, and partly due to an increased effort by the NOAO-S Deputy Director managing the Facilities Operations department: 0.8FTE as opposed to 0.4FTE budgeted

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in FY2015. The “Supplies & Materials” budget was augmented by 30% to establish a program of regular replacement of non-capital equipment and materials, about 20MCLP, although the largest increase in these expenses is due to the increased prices for “Meals & Lodging” on-site. Other notable increases are the expected usage of the Maintenance group and Garage group, budgeted under “NOAO Services”, for work related to the infrastructure, hotel and restaurants and an increase in the budget for “Freight”, in particular in the cost center Reception: this was not budgeted for correctly in FY2015, and has been corrected in FY2016.

As mentioned above, in addition to regular operations, we plan to carry out several critical improvement and upgrade projects in FY2016, and the costs for these projects are included in the FY2016 budget. In the future, we plan to include improvement and upgrade projects on a yearly basis in the annual plan and budget, albeit on a more modest scale. We expect that in FY2016 we will make significant progress with upgrading equipment and infrastructure to meet Chilean Health and Safety standards. Once that has been established we will be able to maintain this quality by including yearly smaller improvement and upgrade projects. That said we do expect that road repairs will continue well into FY2017 (see also Section 4) and the costs for these repairs will be considerable.

The improvement and upgrade projects fall into two categories: (i) projects that are essential to bring critical infrastructure in compliance with Chilean Health and Safety regulations and (ii) projects that are necessary to improve the robustness of the current infrastructure, e.g. improvements to the medium voltage power system, to ensure more stable commercial power, and significant road repairs after the severe rain and snow storms during the winter of 2015. These projects are discussed in the Section 4 “FY2016 Projects”.

The improvement and upgrade projects require “Supplies & Materials”, “Contracted Services”, and “Capital Equipment”. Departmental overhead, i.e. “Facilities Support”, and the Business Service Charges are also included in the budget of these projects.

A subset of the upgrade projects is earmarked as “Extra Projects”. The “Extra Projects” are important, but less urgent than the projects included in the regular budget. These projects are discussed in the Section 5, “Extra Projects” and the budget for these projects comes to a total of 123 MCLP. No departmental overhead (Facilities Support) is charged to these extra projects, to be able to fix the share, census and per-use charges, while the “Extra Projects” are still under discussion.¹

3. Details per work package

In Table 2 the budget per activity, or work package, is presented with information on the budgeted cost for labor, non-payroll and internal sales. The table is divided into three parts, grouping the work packages by mountain share, census, and per-use services.

Several minor changes were made in the FY2016 cost-sharing model, reflecting changes in the organizational structure of the department. The department is now organized by activity rather than

¹ Departmental overhead is distributed over the cost centers in terms of percentage of the budget. Thus, if this overhead were also distributed over the “Extra Projects”, removing one or two projects from the annual plan & budget, would affect all charges.

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location and the “Payroll and Fringe Benefits Expenses” for management are distributed accordingly. An additional work package “Mnt General Operations” covers general operations costs for mountain infrastructure, while the work package “Safety & General Operations” covers safety and general operations costs for all departmental activities, independent of location.

The work package “Garage” was removed from the Census Charges. The garage mostly provides services for road maintenance, heavy equipment and the vehicle fleet of the department; these are all internal services. For FY2017 we will consider recovering costs on a time-card basis rather than a per-use charge.

The work package “Common Areas” was removed from the overhead and placed under the La Serena Census group.

In this Section we discuss in more detail the general operations and safety work packages and the work packages concerning commercial power and power generation for Cerro Tololo. The projects planned for FY2016 are discussed in Section 4, and “Extra Projects” are discussed in Section 5.

3.1. General operations

In FY2016 we plan to train and certify several of the Facilities Operations staff to be able to provide better and more reliable service. This includes training and certification of the electrical technicians, plumbers and emergency brigades. The associated budget is included in the work packages “Safety & General Ops” and “Mnt General Ops”. These work packages also includes maintenance of the Facilities Operations fleet and renewal of one of the Facilities Operations vehicles.

In La Serena we plan to improve the condition of the fire hose housing by creating dry areas around the housings. In addition, we are including maintenance for these housings to the FY2016 program. The budget for these improvements are included in the work package “Common Areas”.

3.2. Commercial Power & Power Generation on Cerro Tololo

The storms of March 2015 caused severe damage to the electric system providing commercial power to Cerro Tololo. All facilities on Cerro Tololo have since then been running on generator power, and as a result, the infrastructure group has been spending significantly more time on the power generation system on Cerro Tololo than planned for. It is anticipated that this increased effort will continue during FY2016, and this is reflected in the budget for the work package “Power Generation”.

To bring the commercial power system back up, NOAO is repairing the equipment, including the step-down transformer for the incoming commercial power and the frequency converter. Renovation of all critical equipment, including backup generator and the main frequency convertor, is being considered. These costs will be covered by NOAO, under a budget completely separate from the NOAO-S Facilities Operations budget. The amount budgeted by NOAO for this work is approximately \$700 kUSD.

4. FY2016 Projects

In this Section we discuss the most critical improvement and upgrade projects planned for and included in the FY2016 budget in the work package “FY2016 Projects”. The costs associated with these projects are

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presented in Table 3, and those costs are recovered through the “FY2016 Projects Share Charge”. The budget for projects common for both mountains, 160 MCLP, is included in the common part of the Mountain Share Charge. The budget for Tololo specific projects, 40 MCLP, is only included in the Tololo Mountain Share Charge and the budget for Pachón specific projects, 95 MCLP, is only included in the Pachón Mountain Share Charge. This is including inflation correction and overhead

4.1. Power Line Stability

To improve the stability of the power lines, connecting the facilities on the two mountain tops with the commercial power system, we plan to purchase and install automatic circuit re-closers at critical points in the AURA power line system: (i) at the entrance where the AURA power lines connect to the commercial power grid, currently provided by CONAFE; (ii) at the bifurcation, where the power line is split to provide power to each of the two summits; (iii) at the entrance of both summits. These re-closers will not only protect the step down transformers and other electrical equipment on the summits, but will also allow us to monitor performance of the incoming power as well as performance along the power lines. In addition, the re-closers will provide diagnostic tools, allowing for faster recovery of failures along the power lines.

Purchase and installation of the three most critical of these automatic circuit re-closers, (i) and (ii), are included in the regular budget as part of the work package “FY2016 Projects”. This equipment is essential for the protection of all electrical equipment at the AURA facilities. The two re-closers that are to be installed at the entrance of both summit are included in the budget for the “Extra Projects”. While these re-closers will also add to the stability of the system, they are less critical than the three re-closers mentioned earlier.

4.2. Communication Network

In FY2016 we are planning the following improvements for the mountain communication system: moving the antenna on Cerro Pachón, and installing a repeater on the La Serena recinto, and installing a base station in the Facilities Operations offices. These upgrades should make the radio communication with and on the mountains more reliable.

4.3. Hotels Tololo, Pachón, and La Serena

Maintenance for the hotels on Cerro Tololo and Cerro Pachón is included in the FY2016 plan. For example, bathrooms in the Hotel Pachón will be renovated, and hotel rooms on Tololo will be painted.

4.4. Certification of equipment

To comply with Chilean health and safety regulations, AURA has requested that critical equipment at the Mountain Facilities is certified by Chilean authorities. This includes certification of the electric substations on Cerro Tololo and Cerro Pachón, heaters in all summit facilities, the policlinics, and the kitchen facilities. In most cases the equipment or the areas where the equipment is located has to be upgraded before we can request certification by the authorities. The costs associated with these upgrades and certifications are included in the work package “FY2016 Projects”.

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4.5. Road Maintenance

In FY2016 intense road maintenance & repairs are planned to recover the road, which suffered severe damage during the 2015 storms, and to prepare for the increased usage of the road due to construction of LSST. This includes renewing the surface layer, repair of the guardrails, repair of the curb and repair of washouts. Furthermore, major maintenance and repairs for the road grader are planned.

The budgets for repairs of curb and washout are preliminary estimates. We are currently in discussions with several companies, to be able to compare competencies, work plan and economic offers. The repairs planned for FY2016 are the minimum needed to recover critical parts of the road. In the coming years we plan to catch up on road maintenance, and this is part of our discussions with these companies.

5. Extra Projects

In addition to the upgrade & improvement projects included in the regular budget we proposed to take advantage of the favorable USD/CLP exchange rate and include four extra projects in the FY2016 plan in the work package “Extra Projects”. However, because of the steep increase in Mountain Share Charges, it was decided to postpone these Extra Projects till FY2017. For completeness, they are nevertheless presented in this Section.

These projects are, in order of priority:

- Purchase of an additional electric protection equipment to be installed at the entrance of the power lines on Cerro Tololo and Cerro Pachón respectively.
Purchase and installation of these electric protections will complete the project to improve the robustness of the commercial power system for the two mountains. Ideally these protections are purchased and installed at the same time as the Automatic Circuit Reclosers at the entrance to the AURA property, and at the bifurcation are installed. This would facilitate the whole process of monitoring the system, diagnosing faults and improving safety of the equipment.
- Maintenance of the Tololo and Pachón water tanks
There are seven water tanks, three of which are located on Cerro Tololo for general water storage, a fourth one on Cerro Pachón, serving the programs on Cerro Pachón and three tanks between the water well down at the bottom of Quebrada San Carlos and the summit of Cerro Tololo, which are part of the water supply system. We propose to carry out preventative maintenance of these tanks and renovate the pumping system where necessary. Structural repairs of the water tank system on Tololo is also necessary, as those tanks and the connecting water tubes suffered severe damage during the September 16 earthquake in the IVth region. In the future, the purchase of a second water tank for Cerro Pachón and a fourth tank on Cerro Tololo may be considered. This would make operations on both mountains less vulnerable during maintenance of the water supply system or when problems in this supply system occur. For FY2016 20 MCLP is budgeted in the work package “Extra Projects” to carry out the most pressing repairs and maintenance.
- Purchase of a backhoe loader
The heavy equipment used to carry out maintenance of the roads to Cerro Pachón and Cerro Tololo consists of a road grader, a frontend loader, and a dump truck. To improve the quality and

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efficiency of the road maintenance work and to work safely in the landfill area we propose to purchase a backhoe loader.

- Renovation & certification of the heaters of the Tololo houses
Upgrading & certifying the heaters of the Tololo houses will complete the project to upgrade and certify all heating systems of the mountain facilities. It will be most efficient to carrying this out as one integral project, upgrading & certifying all systems at once.

An overview of the budget for these projects is given in Table 4. The Business Service Charges associated with these projects are also included in the table for completeness. The costs allocated for the projects amount to a total of 123 MCLP or 206 kUSD at 600CLP per USD.

6. The cost recovering charges for FY2016

The FY2016 charges to recover the costs of maintaining the infrastructure and providing the services are presented in Table 5. The mountain share charges are split up between a regular share charge, covering routine maintenance of the infrastructure as well as the critical improvement and upgrade projects to be carried out in FY2016 and, “extra share charge” covering the costs for the four additional improvement projects as discussed in the previous Section. The charges are based on the costs for providing the services and are calculated based on the “Two-Mountain Model” in case of the Mountain Shares, on number of employees, in case of the census charges, and on the estimated usage in case of the per-use charges. The estimated cost per program for FY2016 is listed in Table 6.

6.1. Mountain Share Charges

Mountain share charges are calculated based on the Two-Mountain Model, described in a presentation by van der Blik & Heathcote at the NOAO-S Facilities Operations Working Group meeting of September 3, 2014. Cost for infrastructure common to both mountains is split 50/50 over the two mountains, Cerro Tololo and Cerro Pachón. The cost for infrastructure on Cerro Pachón and the “Pachón-share” of the common infrastructure is split between LSST, Gemini-S and SOAR, whereby LSST and Gemini-S each count as one share, and SOAR as 0.8 of a share. The cost for infrastructure on Cerro Tololo, and the “Tololo-share” of the common infrastructure is split between the tenants / programs, proportional to the diameter of the telescopes, with a reduction of 70% for remote telescopes, and telescopes which are in use less that one third of the year. Some telescope projects have changed or will be changing configuration or mode of operation in FY2016, e.g. a telescope is added, or instead of full year operation the project will run part time in FY2016 or vice versa. These changes are included in the calculation of the FY2016 Tololo Mountain Share Charges.

The Mountain Share Charges for FY2016 have increased significantly when comparing these in CLP with the FY2015 Shares. The largest component of this increase is the budget for the improvement and upgrade projects that were discussed in Section 4, although IPC and salary increases also contribute to the increase. In FY2016 an exchange rate of 600 CLP per USD was assumed, whereas for the FY2015 an exchange rate of 500 CLP was assumed for expenses in USD.

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6.2. Census Charges

The “All Places, All Staff” census charge covers the costs for reception, including the mail pouch to Santiago and the USA, and general safety and operations for all areas under supervision of the Facilities Operation department. For FY2016 this charge increases by 9% compared to the FY2015 charge, an increase that is mostly due to the increased budget for the Reception work package to cover the costs of freight costs for the mail pouch and correspondence, which were omitted in the FY2015 budget.

The census charge for La Serena based staff covers the costs for the communications network (call manager), the La Serena guard service (security) and the cost for maintaining the common areas. The cost for maintenance for the common areas used to be included in the La Serena overhead. In the FY2016 this work package is included in the La Serena census charge. As a result the La Serena census charge is increased to about 1 MCLP per employee. Note, the costs for the common areas, mostly water and the gardener service, are shared with the residents of the La Serena recinto; only the part corresponding to the programs is included in NOAO-S Facilities Operations budget.

6.3. Charges for the Per-Use Services

The charges for the Per-Use Services depend very much on the estimated quantity of use, and as a result fluctuate from year to year. This effect is particularly noticeable when comparing the FY2016 charges for mountain lodging and the meal services to the FY2015 charges.

The charge per night for mountain lodging increases from 18,350 CLP to 26,367 CLP despite the fact that the budget for the work package “Mnt Hotels” increased by only 2%: the increase in the charge is almost entirely due to the decrease in the estimated usage of the mountain hotels. Note: on Cerro Pachón an extra charge of 16,201 CLP is added to pay off the debt with AURA for building the Hotel Pachón, i.e. lodging on Pachón costs 42,568 CLP per night.

Similarly, while the budget for the work package “Mnt Kitchens” decreased by 1%, the price for a meal increases by slightly more than 7%, because usage is expected to be lower in FY2016, than was estimated for FY2015. In this case, the increase in the charge is entirely due to the decrease in estimated usage. The FY2016 usage of both the mountain hotels and the meal services are based on actual usage during FY2015, which was lower than estimated, and take into account the fact that Gemini-S will start remote operations towards the end of the fiscal year, diminishing the demand on the mountain hotels.

The expected water consumption on Cerro Pachón is significantly higher because of the high demand by LSST construction. Water and water transport are “Per Use” services, and the high demand brings the unit price slightly below the FY2015 unit prices, even though extra labor and materials are budgeted for in the work packages “mountain water & sewage” and “water transportation” to meet the LSST demand. The budget for these work packages increased by 65% and 1259% respectively

The budget for the work package “Water and Sewage La Serena” increased by 41%, to account for the contribution to the municipal sewage system, a cost that was omitted in the FY2015 budget. The corresponding charge also increases by a similar amount, 40%.

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Table 1: NOAO-S Facilities Operation FY2016
The FY2015 budget is included in the last column for comparison.

	Budget FY 2016 Base	Budget FY2016 Projects	Budget Extra Projects	Total Budget FY 2016	Budget FY 2015
TOTAL REVENUES	1,801,997,467	294,537,447	123,435,000	2,219,969,914	1,595,658,773
Payroll and Fringe Benefits Expenses	820,057,136	-	-	820,057,136	709,819,005
Supplies & Materials	460,781,808	11,648,000	-	472,429,808	355,062,772
Utilities & Office Expense	193,937,442	-	-	193,937,442	193,337,066
Equipment Repair & Maintenance	-	-	-	-	1,661,247
Equipment & Building Leases	-	-	-	-	1,718,018
Travel Expenses	34,353,636	-	-	34,353,636	31,701,239
Foreign Travel - Staff	486,122	-	-	486,122	689,300
Miscellaneous Expense	20,209,866	-	-	20,209,866	2,498,104
Insurance	1,925,345	-	-	1,925,345	3,106,903
Conferences & Mtgs\Training	14,314,954	-	-	14,314,954	6,033,709
Contracted Services	323,333,455	204,256,000	2,600,000	530,189,455	301,452,435
NOAO South Services	156,486,391	-	-	156,486,391	39,752,665
Recruitment - Ads & Misc Exp	99,926	-	-	99,926	143,642
Facility Support	(33,842,727)	33,842,727	-	-	-
Freight	26,824,998	-	-	26,824,998	2,517,730
Capital Equipment	48,171,196	31,200,000	114,400,000	193,771,196	56,185,500
Non-Payroll Expenses Subtotal	1,247,082,412	280,946,727	117,000,000	1,645,029,139	995,860,330
Internal Sales	(360,849,370)	-	-	(360,849,370)	(195,256,199)
Business Service Charges	95,707,289	13,590,720	6,435,000	115,733,009	85,235,636
TOTAL EXPENSES	1,801,997,467	294,537,447	123,435,000	2,219,969,914	1,595,658,772

Note on Expense Code "Facilities Support": Departmental overhead is distributed over the cost centers in terms of percentage of the budget per cost center, except for the "Extra Projects". The FY2016 base budget includes the costs of this overhead, but only part of the "revenue". The remainder of the "revenue" is budgeted in the work package "FY2016 Projects". The FY2016 base budget shows a negative "Facilities Support", matching the "Facilities Support" in FY2016 Projects. No departmental overhead is charged to the "Extra Projects", so that, if one or more of these projects were not to be approved, the share charges, census charges and per-use charges would not be affected.

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Table 2: Labor & non-payroll, per work package
The FY2015 budget is included in the last column for comparison.

Shared mountain infrastructure & services

Work Package	Labor	Non-Payroll	Total Budget	FY2015 Budget
Mnt General Ops	23,034,074	143,341,538	166,375,612	
Security Mnt	0	35,012,224	35,012,224	33,516,926
Emergency Medical Services	37,610,543	119,910,485	157,521,028	153,796,762
Road Maintenance	21,216,749	178,747,948	199,964,697	163,876,185
Power Line Maintenance	20,333,679	69,679,609	90,013,288	76,948,675
Power Generation	8,084,320	18,833,076	26,917,396	16,759,625
Communication Network	7,559,472	16,005,501	23,564,973	33,679,872
	117,838,837	581,530,381	699,369,218	478,578,046
FY2016 Projects	0	294,537,447	294,537,447	
Extra Projects	0	123,435,000	123,435,000	52,750,000
	117,838,837	999,502,828	1,117,341,665	531,328,046

General and La Serena common infrastructure & services

Work Package	Labor	Non-Payroll	Total Budget	FY2015 Budget
Safety & General Ops	19,209,755	71,048,147	90,257,902	37,450,802
Security La Serena	0	64,125,933	64,125,933	70,915,007
Common Areas	0	62,169,549	62,169,549	
Garage				59,438,696
Reception	27,874,532	39,154,398	67,028,930	40,356,708
Communication Network	7,559,472	26,846,450	34,405,922	31,562,569
	54,643,759	263,344,479	317,988,238	239,723,783

Per-use services

Work Package	Labor	Non-Payroll	Internal Sales	Net Budget	FY2015 Budget
Mnt Janitorial Services	12,843,095	13,309,607	(10,146,174)	16,006,528	24,197,199
Mnt Kitchens	186,181,260	348,199,474	(103,811,002)	430,569,732	435,935,595
Mnt Hotels	46,681,179	167,641,250	(51,767,163)	162,555,266	159,575,644
Mnt Water & Sewage	21,987,642	41,777,559	(26,910,425)	36,854,776	22,380,074
Mnt Water Transportation	5,402,430	34,833,814	(10,265,793)	29,970,451	2,205,635
LS Janitorial Service	27,876,075	7,590,857	(1,015,945)	34,450,987	41,454,341
LS Hotel	6,616,757	23,700,869	-	30,317,626	38,241,456
LS Water & Sewage	881,709	31,611,229	(11,608,696)	20,884,242	14,837,723
Maintenance Group	83,148,574	12,322,732	(86,327,467)	9,143,839	75,778,618
Garage	55,222,195	17,661,074	(58,996,705)	13,886,564	10,000,661
	446,840,916	698,648,465	(360,849,370)	784,640,011	824,606,944

Total	619,323,512	1,961,495,772	(360,849,370)	2,219,969,914	1,595,658,773
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Table 3: FY2016 Improvement & Upgrade Projects

FY2016 Projects	Estimated Cost
Automatic Circuit Reclosers	30,000,000
Communication Network	9,300,000
Renovations & repairs Hotel Tololo	5,400,000
Renovations & repairs Hotel Pachón	6,000,000
Severance Pay	53,400,000
Upgrades & certifications	
Electric Substation Tololo	3,000,000
Electric Substation Pachón	7,000,000
Heaters Hotel/Kitchen Tololo	13,000,000
Heaters Hotel/Kitchen Pachón	6,000,000
Kitchen Tololo	9,500,000
Kitchen Pachón	50,000,000
Road Repair / Maintenance	
Repair of curb	30,000,000
Repair of washout	15,000,000
Overhead & IPC	
IPC	9,504,000
Business Service Charges	13,590,720
Overhead	33,842,727
Total	294,537,447

**Table 4: Extra projects
Postponed to FY2017**

Project	Estimated cost
Electric protection equipment @both mountains	20,000,000
Maintenance Water Tanks	20,000,000
Backhoe loader	50,000,000
Renovation & certification heaters Tololo houses	22,500,000
Overhead & IPC	
IPC	4,500,000
Business Service Charges	6,435,000
Total	123,435,000

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Table 5: Cost recovering charges for FY2016
Mountain Share Charges consist of base charge and regular projects charge
FY2015 charges are included in the last column for comparison.

FY2016 Mountain Share Charges, based on 2-mountain model

Program	Base	Projects	Share	FY2015 Share Total
CTIO 4M	100,453,790	35,484,329	135,938,119	72,974,664
KASI	40,485,155	14,300,989	54,786,144	29,410,444
SMARTS 1.5m	12,651,611	4,469,059	17,120,670	27,572,291
SMARTS 1.3m	32,894,188	11,619,553	44,513,742	23,895,986
PROMPT	28,162,486	9,948,125	38,110,611	19,631,471
SMARTS 0.9m	22,772,900	8,044,306	30,817,206	16,543,375
LCOGT	28,845,673	10,189,455	39,035,127	16,543,375
T8OS	20,900,461	7,382,886	28,283,347	15,183,142
Other	12,651,611	4,469,059	17,120,670	9,190,764
LSST	129,141,611	62,579,468	191,721,079	99,572,365
GEMINI	129,141,611	62,579,468	191,721,079	99,572,365
SOAR	103,313,289	50,063,574	153,376,863	79,657,892

Census Charges

	FY 2016	FY 2015	
La Serena Based	1,057,246	678,659	per employee/yr
All Places All staff Census	731,567	669,494	per employee/yr

Per-use Charges

Mountain Facilities	FY 2016	FY 2015	
Water - Tololo	7,344	7,586	per cubic meter
Water - Delivered to Pachon	15,076	15,114	per cubic meter, includes transport
Tololo Meals	13,965	13,015	per meal
Tololo Lodging	26,367	18,350	per night
Pachon Meals	13,965	13,015	per meal
Pachon Lodging	42,568	34,551	per night, incl. 16,201 CLP for AURA loan
Janitorial Services	13,474	14,159	per hour
La Serena Facilities	FY 2016	FY 2015	
Garage - Labor	19,287	4,583	per hour
Maintenance Group - Labor	16,933	19,758	per hour
Janitorial Services	9,444	10,420	per hour
La Serena Motel	38,572	42,116	per night
Water and Sewage La Serena	934	666	per cubic meter

NOAO-S Facilities Operations

Table 6: Estimated Costs per Program

	Share Charges Regular	Share Charges Projects	Census Charges Total	Per-use Charges Total	Total per program, @600CLP/USD	
					CLP	USD
LSST	129,141,611	62,579,468	10,407,197	71,827,894	273,956,169	456,594
GEMINI	129,141,611	62,579,468	136,350,808	198,368,252	526,440,139	877,400
SOAR	103,313,289	50,063,574	10,732,876	30,736,416	194,846,156	324,744
CTIO	100,453,790	35,484,329	105,289,632	279,121,713	520,349,465	867,249
SMARTS 1.3m + 1.5m	45,545,799	16,088,613	2,194,700	41,984,656	105,813,768	176,356
SMARTS 0.9m	22,772,900	8,044,306	-	-	30,817,206	51,362
Schmidt	-	-	-	-	-	-
URAT	12,651,611	4,469,059	-	-	17,120,670	28,534
PROMPT	28,162,486	9,948,125	-	-	38,110,611	63,518
LCOGT	28,845,673	10,189,455	-	-	39,035,127	65,059
KASI	40,485,155	14,300,989	1,463,133	31,453,404	87,702,681	146,171
TBOS	20,900,461	7,382,886	1,463,133	4,578,615	34,325,095	57,208
WHAM	12,651,611	4,469,059	-	-	17,120,670	28,534
SARA	12,651,611	4,469,059	-	-	17,120,670	28,534
Mearth	12,651,611	4,469,059	-	-	17,120,670	28,534
Other	-	-	-	107,680,078	107,680,078	179,467
AURA (O, CAS, HR)	-	-	50,086,757	-	50,086,757	83,478
Houses	-	-	-	18,888,981	18,888,981	31,482
Total	699,369,218	294,537,447	317,988,238	784,640,011	2,096,534,914	3,494,225