

NOAO South Facilities and Operations

Service Level Agreement for Observatory Programs at Cerro Tololo and Cerro Pachón by NOAO-South Facilities and Operations *July 22, 2014*

Effective Date:

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|------------------------|--------------------------------------|
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| 1.1 | July 4, 2013 | Incorporate input from Client programs – Heathcote (SOAR), Krabbendam (LSST), Levenson & Kissler-Patig (Gemini), van der Blik (CTIO), Silva (NOAO) | |
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| 1.5 | May 20, 2014 | Reformat Section numbering | |
| 2.0 | July 22, 2014 | Incorporate input from AURA/Client Management and from lead personnel of Service Provider | |



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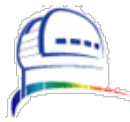
NOAO-South Facilities and Operations

NOAO-S Facilities Operation Service Level Agreement, Version 2.0, July 22 2014

Approval

(By signing below, all Approvers agree to all terms and conditions outlined in this Agreement.)

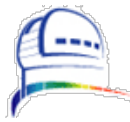
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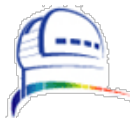
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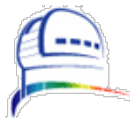
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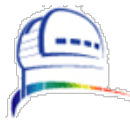
I. Agreement Overview

This document establishes a Service Level Agreement between the **Service Provider**, NOAO-South Facilities and Operations, and the **Clients**, Observatory Programs at Cerro Tololo and Cerro Pachón, for providing a defined scope of **Maintenance and Operational Support Services** as required to sustain the operations of the Clients at their summit and base facilities.

This Agreement remains valid until superseded by a revised agreement mutually approved by the stakeholders. This Agreement outlines the parameters of all maintenance and operational services as they are mutually understood by the primary stakeholders.

II. Key Definitions and Abbreviations

1. **Advisory Committee** – a standing committee with representation of the Clients and Service Provider that is empowered to act on behalf of all stakeholders with regard to periodic review of the costs and means of rendering of the services. (*Committee charge TBD*)
2. **Agreement** – Service Level Agreement (this document)
3. **AURA-CAS** – AURA Central Administrative Services, which provides accounting and procurement services for both the Service Provider and the Major Clients.
4. **AURA, Inc.** – the legal owner of the AURA Observatory properties in Chile and the legal entity responsible for all of the Client Site Agreements and the legal managing entity for the Service Provider (NOAO-South Facilities and Operations).
5. **AURA-O** – AURA Observatories, the official representative for all of AURA entities in Chile. (For specific role and relationship to parties in this agreement, refer to *Charter for the Operation and Management of AURA's Observatory in Chile*). AURA-O is also a Client in the context of this agreement, as the AURA offices and staff housing which is managed by AURA-O are located on property managed by the Service Provider.
6. **Additional Work** – Any services beyond the scope of specific services defined in this agreement, which may be requested and funded additionally by the Client(s).
7. **Client(s)** – Any and all observatory programs with active or future facilities at CT or CP.
8. **Client Representative** – The Client's Site Manager or other person appointed by the Client organization to represent them in issues regarding the services. In the absence of the Client Representative, their designated substitute
9. **Common-use Facilities** – dormitories, dining facilities, equipment enclosures, Operations shops, Operations offices, common warehouses, emergency medical facilities and any other buildings which are maintained by the Service Provider for the purpose of providing the Services defined in this agreement.
10. **CP and CT** – Cerro Pachón and Cerro Tololo observatory sites in Chile
11. **Facilities Manager** – NOAO-South Facilities and Operations Manager
12. **FTE** – Full-Time Equivalent, used in defining labor resources assigned to the services
13. **LS Recinto** – The AURA-owned compound at Colina El Pino s/n, La Serena, Chile where the local headquarters for the major Client and Service Provider organizations are located.
14. **Mountain** – The entire CT and CP area including roads and other common infrastructure
15. **NOAO** – National Optical Astronomy Observatory, a center managed by the Association of Universities for Research in Astronomy (**AURA**) under contract to the National Science Foundation (**NSF**) of the United States.



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16. **Operations Manager** – NOAO-South Deputy Facilities Manager for Operations
17. **Operations Management** – the Facilities Manager, the Operations Manager, and the NOAO-South CT/CP Administrative Manager – or in their absence, their designated substitutes
18. **Service Provider** – NOAO-South Facilities and Operations

III. Objectives

The objectives of this Agreement are to:

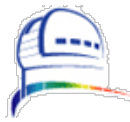
1. Establish the defined list and level of services to be provided by mutual agreement between the Clients and Service Provider,
2. Present a clear, concise and measurable description of those services,
3. Define the resources required to provide those services as a basis for cost recovery by the Service Provider,
4. Ensure that the required resources are committed so that the Service Provider can consistently provide services to the Clients at the agreed level,
5. Provide clear definition of service ownership, accountability, roles and responsibilities.

IV. Stakeholders

1. The primary stakeholders for the purposes of this Agreement are considered to be all the Clients and the Service Provider.
2. For purposes of review and approval of the Agreement, both initially and periodically, the large telescope programs – Gemini, LSST, SOAR and CTIO (NOAO) – have an active review role. The other smaller observatory facilities at CT and CP are considered to be Clients with all the same rights and responsibilities as the large programs, however, their interests are normally represented by the Director of NOAO-South, who has the authority to establish their Site Agreements and coordinate the subsequent support of their facilities.

V. Periodic Review

1. This Agreement is valid from the effective date outlined herein and is in force until further notice. This Agreement should be reviewed at a minimum once per fiscal year; however, in lieu of a review during any period specified, the current Agreement will remain in effect.
2. The Facilities Manager is responsible for conducting regular, approximately annual, reviews of this document. That review consists of identifying aspects of the Agreement that are of concern, seeking input from the Clients and AURA-CAS on desired improvements, drafting suggested revisions and circulating them to Client and AURA representatives for consideration. The Facilities Manager will then obtain mutual agreements and approvals as required for any proposed



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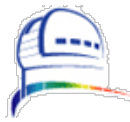
amendments, incorporate all necessary revisions to the Agreement, and communicate the changes to all affected parties.

3. Review of the services by an outside independent advisory panel may be conducted on a periodic basis, as solicited and deemed necessary by the Advisory Committee. Such review would be conducted basically as follows:
 - a. Accompanied by the Facilities Manager, the panel would make a brief in-person inspection of the services as they are rendered.
 - b. The panel would provide written feedback to the Service Provider and Clients regarding:
 1. Compliance with this Service Level Agreement,
 2. Any noted deficiencies in the services or areas for improvement,
 3. Suggested improvements for economy or efficiency,
 4. Relevant comparison to similar services of other organizations.

VI. Responsibilities

1. Service Provider is Responsible for:

- a. Reliably providing the services to the level and scope described in the Definition of Services section of this Agreement. The services are provided on a *best-effort basis*, meaning that the Service Provider makes a well-intentioned, properly planned and appropriately resourced effort to accomplish the work but that the results are subject to prevailing conditions beyond the control of the Service Provider, and that under such extenuating circumstances the services may not be accomplished to the level of full compliance with this agreement.
- b. Management and administrative oversight of the execution of the services. This shall include designating a Facilities Manager to serve as the primary contact responsible for implementation of the services defined in this agreement and high-level coordination with the Clients
- c. Faithfully reporting the performance of the services in compliance with the Reporting section included in the definition of each service in this Agreement.
- d. Regularly verifying economical and efficient means and methods in the rendering of the services, including the periodic review of competitive prices for materials and contracts that support the services.
- e. Promptly informing the Clients of any interruption or change in the performance of the service, including changes caused by factors beyond the control of the Service Provider.
- f. Annually reviewing the quantity of per-use services actually provided and comparing that to the anticipated quantities reported by the clients. Using that information to efficiently plan for staffing and supplies to meet the demand in the coming year and to establish the per-use cost required to cover provision of the service.
- g. Dedicating the necessary labor to accomplish the services and to comply with the Hours of Coverage and Response Times defined in this agreement.
- h. Maintaining and providing to Clients current contact information for key personnel, including the Facilities Manager, Operations Manager and appropriate administrators of the specific services.
- i. Responding in a timely manner to Client concerns or complaints regarding the execution of the services. Taking prompt corrective action as determined necessary and/or providing a timely explanatory response when there are extenuating circumstances that complicate or preclude taking immediate corrective action.



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2. Clients are Responsible for:

- a. Payment of the fees as defined in their Site Agreements and revised annually. Fees are billed to the Clients by AURA-CAS on behalf of the Service Provider.
- b. Promptly notifying the Service Provider of noted lapses or deficiencies in any of the services defined herein. Such notice should be made by the Designated Representative of the Client to the Facilities Manager of the Service Provider or their designee, through the means defined below in Section G-3 and the Service Request sections of each service.
- c. Annually informing the Service Provider of the anticipated quantity of use of services that are charged on a Per-Use basis. Promptly informing the Service Provider if that anticipated demand should change significantly during the year.
- d. Establishing a Designated Representative for all issues related to the services covered by this agreement, and appropriate Technical Representatives for the specific services.
- e. Working collaboratively with the Service Provider to address service-related incidents or requests.

VII. General Conditions – Applicable to All Services

1. Procurement of the Services

- a. The Service Provider renders the services either directly with on-staff labor and direct procurement of materials or by means of external contracts with commercial companies.
- b. The Service Provider determines the most efficient, economical and competent method to procure the services with the advice and consent of the Clients as described herein.
- c. The fees paid by the Clients constitute the sole source of funding by the Service Provider of all the services defined in this Agreement.

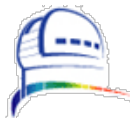
2. General Reporting:

- a. The Service Provider issues regular bi-weekly Operations Reports to inform the Clients of the current activities and conditions related to the services. This includes updates on routine and ongoing activities as well as advisories about pending events that may affect the Client facilities.
- b. The Service Provider provides additional notifications and updates through email and other necessary means regarding service-related events that have direct impact on Client facility operations.
- c. The Service Provider issues Quarterly Financial Reports with information on the cost to provide the services during each quarter of the fiscal year.
- d. The Service Provider issues an Annual Site Financial Report with summary information on the cost to provide the services in the past year. This report is released in November of each year preparatory to a Semi-Annual Site User Meeting in December.
- e. A subsequent report is issued by the Service Provider in April describing the financial projections and proposed fees for the coming fiscal year. At the second Semi-Annual Site User Meeting, to be held in June, the Service Provider presents the basis for establishing the fees to be charged to the Clients to cover the cost of the services for the fiscal year beginning in the next October.

3. Requesting Service and Service Coverage Parameters

The provision of the services covered in this Agreement are subject to the following conditions:

- a. Office hours for telephone and in-person contact: 8:30 to 17:30, Monday – Friday.

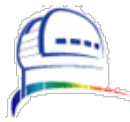


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- b. Urgent service requests outside of office hours may be made to the cellular phones of Operations Management personnel. Information about the appropriate personnel to be contacted off hours will be kept up-to-date via the regular Operations Reports. Best efforts will be made to answer and take action on off-hours calls.
- c. Email support is monitored 8:30 to 17:30, Monday – Friday
- d. Emails received outside of office hours will be collected, however no action can be guaranteed until the next working day
- e. A High Priority will be assigned to service requests and reported problems involving conditions that endanger personnel or critical equipment and/or impede the essential mission of the Client facility. In the determination of a High Priority: *Endanger* shall be defined as causing imminent peril of injury or serious damage. *Critical equipment* shall be defined as telescopes, optics, main computing equipment or servers, primary utility devices, major building elements, or other equipment without which it would be impossible to conduct the primary mission of the facility. *Primary mission* shall be defined as astronomical observation or activities directly in its support, operation of telescopes, scientific testing campaigns, urgent repair of critical equipment, or periodic maintenance of critical equipment required to take place in a limited time frame to avoid significant negative impact on otherwise defined primary-mission activities.
- f. Response to High Priority issues will be made by the Service Provider within 8 hours during office hours or within 24 hours outside of office hours, from the time the request is made by the Client through the appropriate means.
- g. Routine Priority will be assigned to requests and problems that do not qualify as High Priority as defined above. A good-faith effort will be made by the Service Provider to respond as soon as possible to Routine Priority requests, normally within 2 to 5 working days.
- h. Other coverage and response conditions specific to the type of service are described in the Service Requests section and the Hours of Coverage and Response section for each service. These service-specific conditions take precedence over the general coverage parameters in the event of any conflict between the two.

4. Additional Services

- a. Any services beyond the scope defined in this Agreement, will be considered "Additional Services", which may be solicited and separately funded by the Client(s).
- b. A non-comprehensive list of the potential Additional Services is included in the sections describing each defined service. Requests for any of those, or other out-of-scope Additional Services are subject to the provisions below:
 - 1. Depending on the scope and nature of the special services requested, the Service Provider may render these services directly or may contract to an outside agency in consultation with the Client.
 - 2. Requests for Additional Services will be accepted by the Service Provider via the appropriate means during normal business hours, 8:30 to 17:30 Monday through Friday. The initial response to such requests will be within 2 to 5 working days, outlining the approximate time and cost to comply with the request. Following the initial response, if action on the request is agreed upon between the Service Provider and the Client, a specific time frame and course of action will be developed in consultation with the Client. Subsequent bidding, procurement, or direct action by the Service Provider will follow as required to comply with the request.



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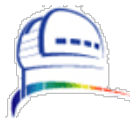
3. Requests for Additional Services should be made with sufficient lead time to allow reasonable response and completion time based on the extent of the requested work.

5. General Description of Labor Resources

- a. The technical staff employed directly by the Service Provider who are assigned to maintenance, repair, and other tasks covered by this agreement consist of personnel trained and qualified in the following capacities,
 1. Heavy equipment operators
 2. Truck drivers
 3. Electricians
 4. Plumbers (water, gas, wastewater)
 5. Heating and air conditioning mechanics
 6. Auto and heavy equipment mechanics
 7. Carpenters (general building maintenance & construction)
 8. Masons (block, concrete work)
 9. Painters, finishers (ceramic tile, interior finishes)
 10. Locksmith
 11. Cooks
 12. Janitors
 13. Nurses/Paramedics trained in emergency medicine
- b. Personnel specialized in a particular capacity are sometimes assigned to assist in other areas, in accordance with their abilities and as required for safe, timely and efficient performance of the work.
- c. The employment, assignment, coordination and oversight of work performed by the technical personnel are the responsibilities of management and administrative staff of the Service Provider.
- d. Safety oversight of the work performed by the Service Provider is the responsibility of the NOAO-S Safety Officer. The labor cost of the Safety Officer and the cost of required safety equipment are funded as a basic part of the services.
- e. Student interns from local training institutions are periodically employed to work under the supervision and tutelage of qualified personnel of the Service Provider. This serves to augment the workforce of the Service Provider and to develop future qualified tradespersons for the observatories and the outside community.
- f. For work beyond the capability or availability of the technical personnel of the Service Provider, outside services are contracted. The appropriate technical and management personnel of the Service Provider supervise and inspect the work of outside contractors.
- g. The AURA-CAS and AURA-HR departments provide support on employee recruitment, payroll, benefits, Client billings, internal accounting, purchasing, contracts, and other activities related to the services covered in this Agreement. The cost of the labor and authorized non-labor expenses associated with that support is passed on to the Client in the form of overhead charged by the AURA departments to the Service Provider.

6. Terms Applicable to Provision of Major Equipment and Tools

- a. Each sub-section of section H describing the specific services contains a list of the major equipment, tools and materials generally required to perform the defined service.



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- b. The periodic replacement required due to normal wear and tear of major equipment (vehicles, road equipment, major utility devices, and other high-cost items considered major equipment), or the provision of major equipment beyond the basic defined set, is not included in the scope of services covered in this Agreement. The Service Provider will advise the Clients as the need for periodic renewal of equipment or the need for specialized equipment arises. Additional dedicated funding for replacement or expansion of the basic set of major equipment will be provided by the Clients subject to their mutual agreement.

Subject for discussion by the Advisory Committee: Consider some mechanism by which to maintain a contingency against potential failure of major equipment. Possibly a factor applied to fees for equipment-intensive services (road maintenance, electrical, etc.) or including depreciation of equipment in the cost model so as to generate income from fees to be used towards eventual replacement of the equipment.

- c. For the major equipment the Service Provider maintains records of age, condition, required maintenance and cost to replace. Planning for equipment renewal or major repair is performed by the Service Provider, however, relevant information regarding its anticipated cost is available to the Clients as an aid to advance planning of foreseeable expenditures.
- d. The periodic replacement of tools and small equipment due to normal wear and tear is included in the scope of services covered in this Agreement.

7. Performance Metrics

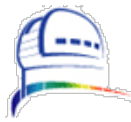
The Service Provider manages the performance of the services through the normal processes of work supervision and guidance, including conducting annual performance evaluations for all staff. In addition to these basic work management measures, where applicable and practicable for the different types of provided services, performance metrics are developed by the Service Provider to track and report the effectiveness of the delivered services. These metrics are defined within the specific Service Descriptions. These statistics will be used by the Service Provider to:

- a. Establish and maintain a standard of service which satisfies the requirements defined in this agreement,
- b. Identify negative performance trends and take necessary corrective actions,
- c. Gauge the effectiveness of improvements in practices, equipment or materials,
- d. Gauge the cost efficiency and cost competitiveness of the service,
- e. Report performance to the Clients on a periodic basis.

Note that all performance metrics are to be verified as feasible. Any increase in service scope (admin labor, special equip, etc.) required to achieve them is to be noted.

8. Redress of Problems

- a. If a problem is identified in accomplishing the defined services, and the response to the problem by the Service Provider is deemed by the Client to be inadequate, the Designated Representative of the Client and the Facilities Manager will work together to resolve the conflict. If that effort proves unsuccessful, the issue may be appealed to the level of AURA, Inc. for redress. *Reviewer comment: define specifically who the appeal is to- e.g. First go to NOAO-S Director. If the conflict can't be resolved at that level, then the issue would be raised to the Center Directors (i.e. Kissler, Silva and Kahn) for resolution. Alternatively, from the NOAO-S Director the appeal could go to AURA-O with copy to AURA Corp.*
- b. The Service Provider makes a good-faith effort to employ staff and maintain resources as required to deliver the services defined in this Agreement. However, as a department of a non-profit organization, NOAO-S Facilities receives no income beyond what is needed to

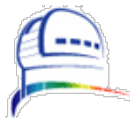


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provide the services. The Service Provider therefore has no profit margin from which to pay penalties or reimburse Clients for deficiencies and shall not be subject to any form of financial penalty or due to a lapse or deficiency of the service for any reason.

VIII. Definition of Services

The following sections define the covered scope, requirements, and responsibilities, as well as the terms of request-response and reporting for each of the specific types of services that comprise this Agreement.



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1. Road Maintenance

Basic Purpose: To ensure safe reliable routes for motor vehicle access as required for the operation and maintenance of all Client facilities and all infrastructure and facilities maintained by the Service Provider on behalf of the Client programs.

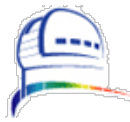
1.1. Definition of Maintained Roads

- **Main Roads** are defined as the unpaved roadways starting at the highway (*Ruta 41*) leading to the Control Gate for the observatories, from the Control Gate to the fork in the road (*El Quisco*), and from El Quisco to the Cerro Pachón and Cerro Tololo observatory sites. The upper limit of the Primary Roads is at the point at which they connect to the Paved Observatory Roads that subsequently lead to each of the facilities within the Observatories. The total extent of the Main Roads is approximately 50 km of unpaved roadway with an average width of approximately 6 m. The Main Roads require a continuous regime of maintenance.
- **Paved Roads** are the concrete paved roadways in the vicinity of the observatories and also include the main concrete roadways on the LS Recinto. The total length of the Paved Observatory Roads is approximately 5 km, and the total Paved LS Recinto Roads approximately 1 km. The average width of the Paved Roads is approximately 6 m. These roads require limited maintenance, as the concrete pavement is relatively impervious to wear.
- **Secondary Roads** are the unpaved roadways and driveways that lead from the Main Roads or the Paved Observatory Roads to the parking and service areas of each individual facility. The total extent of the Secondary Roads is approximately 8 km with an average width of 3.5 m. Although they are unpaved, the Secondary Roads are subject to significantly less traffic and at lower velocities than the main roads and consequently require less maintenance.
- **Service Roads** are the unpaved and relatively unimproved roadways that provide access to service infrastructure areas, such as power lines, water pumping stations, and site testing equipment. The total extent of the Service Roads is approximately 50 km with an average width of 2.5 m. These roads are appropriate only for 4-wheel-drive vehicles travelling at low velocities. They are maintained infrequently, only as required for safe use by service vehicles. Service roads also include the unpaved access roads to service infrastructure areas on the LS Recinto.

1.2. Scope of Service

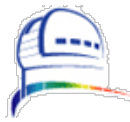
Normal Routine Maintenance

- **Main Roads:**
 - The heavy equipment operators (Operators) who maintain the roads carry out a continuous campaign of leveling and smoothing of the driving surface of the roadway using a road grader and other necessary equipment. This maintenance includes periodic replacement of the driving surface, as necessitated by erosion and wear, using earthen material trucked from identified borrow-pit areas on Observatory property.
 - The Operators endeavor to minimize bumps, ruts, washboard surface, and loose rock material in the roadway.



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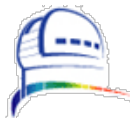
- To prevent erosion and other water related damage to the roadway, periodically the drainage channels along the main road are restored and the culverts are cleared of sediment and other obstructions. This is normally performed once per year, prior to the winter rainy season.
- Operations management personnel conduct a driving inspection of the main roads on a daily basis and oversee the activities of the Operators. Management communicates with the Operators regularly to establish priorities for areas of the roadway requiring attention and to convey any special requirements or instructions.
- **Paved Roads:**
 - Operations management regularly inspects for any potential damage to the paved roads (e.g. extreme cracking of concrete pavement, impact damage, sinking or erosion of the substrate) and arranges for repairs as required.
 - The joints in the paved roads are resealed with an appropriate flexible sealant approximately every 5 years or as required by environmental deterioration.
 - Lane separations, crosswalks and traffic directions painted on the paved roads are repainted approximately every three years or as otherwise required due to wear caused by traffic and weather.
- **Secondary Roads**
 - Approximately once per year the Operators smooth and level the secondary roads providing fill material as needed to renew the driving surface.
 - Between annual maintenance work, Operations Management remains alert for conditions that may impede the use of the Secondary Roads for necessary access to the Client facilities. Users of the facilities accessed by the Secondary Roads inform Operations Management of the need for specific repair as required to maintain access.
- **Service Roads:**
 - The Operators periodically improve the Service roads utilizing a bulldozer, road-grader or other equipment as required to maintain safe access for 4WD service vehicles. Users of the Service Roads inform Operations Management of the need for specific repair as required to maintain access.
- **Reporting and Repair of Unsafe Conditions:** Operations Management, Operators, and users of all roads are vigilant for any unsafe conditions. Operators correct these conditions immediately when feasible. When not feasible to correct with the normal available resources (defined below), the Operators advise Operations Management of the need for additional contracted maintenance or repair of the unsafe condition. The response and completion time for such needed repairs depends on the level of hazard caused by the condition. Conditions presenting serious hazard to the safe passage of vehicles are repaired within one working day or, in cases where that is not immediately possible, appropriate warning devices are deployed to warn drivers of the unsafe condition until it can be effectively repaired.
- **Seasonal Considerations:** The normal routine maintenance procedures and standards outlined above are employed throughout the year. The only significant seasonal variation is during the winter when special weather-related procedures and protocols are in place as noted in the following section.



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Road Maintenance After Storms or Other Events

- Following winter storms with extensive snowfall or other events resulting in roadway conditions that are unsafe for normal vehicular travel, the roads are cleared by the Operators utilizing a bulldozer, road grader and/or other necessary equipment. Clearing as required to allow 4WD vehicle access to all sites is normally accomplished within two working days after the storm, except in cases of very heavy rain or snowfall which can require up to a week to clear.
- Road maintenance after winter snow storms, which is the most prevalent event necessitating clearing, is conducted in accordance with the specific protocols of the Winter Operations Plan. This document, in effect from April 15 to September 15 of every year, specifies the sequence of road clearing work as well as the means of establishing safe passage on the roads for various types of vehicles. The Winter Operations Plan is reviewed annually by the Facilities Manager and by the Site Managers of the major Client Programs. Any necessary revisions are incorporated by the Service Provider.
- In accordance with the Winter Operations Plan, and more generally applicable to any event resulting in potentially unsafe road conditions, the Operations Manager of the Service Provider or their designated representative has the following responsibilities and authorities:
 - To restrict the transit of people and vehicles on any of the roads covered in this Agreement;
 - To issue special instructions related to abnormal or emergency situations;
 - To suspend activities related to access and use of the sites;
 - To order the evacuation of personnel from the mountain sites prior to the normally scheduled times, in cooperation with the Site Managers;
 - To notify users of the roads, including scheduled passengers in the common transport vehicles (bus and shuttle), regarding the types of vehicles allowed to use the specific roads and under what restrictions. The means and timing of this notification shall be in accordance with the Winter Operations Plan, regardless of the type of emergency or the time of year in which it occurs.
 - To coordinate emergency response activities of Mountain operations with an Emergency Committee made up of the AURA Observatory Director, the Facilities Manager of NOAO-South, and the Safety Officers of the major Programs;
 - To coordinate emergency activities with the Site Managers according to the information supplied by each Program prior to the emergency.
- Due to the frequency of precipitation events that occur during a typical winter season, road clearing and mitigation of muddy conditions on the unpaved roadways requires increased attention. This does not allow for the entire road surface to be maintained to the same standard of smoothness that is achieved during the non-winter period of the year. The primary attention of the Operators during the winter season, especially following storms, is dedicated to keeping the roads open, passable, and safe.
- During periods of precipitation accompanied by freezing temperatures the Paved Observatory Roads are monitored for ice formation. Salting and other techniques are utilized to keep these roads in safe condition.



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Maintenance of Guardrails and Road Signage

- Appropriate highway-type guardrails are installed and maintained at curves, steep grades and other areas where risk of serious injury from vehicles leaving the roadway is most prevalent. Should additional guardrail be determined to be necessary by mutual agreement of the Clients, this will be treated as a request for Additional Work to be funded separately.
- Signage indicating maximum velocities, curve warnings, special hazards, location of emergency radio stations and other safety information are installed along the roads. This signage is maintained by the Service Provider in a secure and legible condition. Should additional signage be determined to be necessary by mutual agreement of the Clients, this will be treated as a request for Additional Work to be funded separately.

Additional Work

- Any road maintenance services beyond the identified scope will be treated as Additional Work as previously defined. These available special services include:
 - Application of bichofita, (a compound that reduces dust from unpaved roads),
 - Leveling/clearing of secondary roads beyond the normal periodic schedule and the basic requirement to maintain accessibility,
 - Other earthmoving work, (e.g. to create platforms for buildings, equipment or parking),
 - Any work in the parking and service yard areas of the Client facilities (i.e. beyond the Secondary Roads.),
 - Work requiring specialized equipment or operators not described in the Resources section of this Agreement,
 - Installation of additional guardrail or signage.

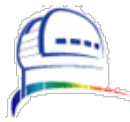
1.3. Dedicated Resources

Labor

- The Service Provider maintains 1.3 FTE (52 man-hours average per week) of Equipment Operators (Operators), trained and certified to operate the Major Equipment described below, dedicated to carrying out the road maintenance work. This currently consists of 2 on-staff Operators, each of whom also have other assigned duties.
- Approximately 0.2 FTE of the time of Operations Management is dedicated to duties related to the road maintenance service.

Major Equipment

- The Service Provider furnishes the necessary major equipment for the road maintenance. The basic set of major equipment necessary to accomplish this work includes:
 - 1 road grader (Caterpillar 135H or equivalent)
 - 1 bulldozer (Caterpillar D6 or equivalent)
 - 1 dump truck (~7 m³ capacity)
 - 1 front-end loader (~4 m³ capacity)



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- This equipment is continuously maintained in serviceable operating condition, with periodic outages as required for routine preventative maintenance. Unscheduled repairs, when required, are performed as expeditiously as possible to minimize any lapse in coverage of the services due to downtime of the equipment. The labor and non-labor resources required to maintain the equipment are included in the Service Provider's accounting of costs and are reported to the Clients via the reporting means defined in this Agreement.

Materials and Small Equipment

- The materials required for road maintenance work are supplied by the Service Provider as an integral part of the service. This includes:
 - Earth materials from borrow pits on Observatory property that is suitable for restoration of the substrate and wearing surface of the road
 - Fuel, oil, fluids, filters, tires, blades and other expendable parts for the major equipment
 - Hand tools, radios and other expendable small equipment
 - Personal protection equipment for the Operators and others involved in road work
 - Cones and other deployable signage as required to advise drivers of road work activities

1.4. Service Requests

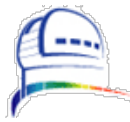
- The normal routine road maintenance activities consist of a continuous, repetitive and well-defined scope of work. There is therefore normally no need for specific request by the Client to assure performance of this service. These services are conducted under the supervision of Operations Management. Concerns of the Clients regarding the quality of the routine road maintenance are directed to the Facilities Manager for attention.
- Road maintenance after storms or other events is also handled without special request, as Operations Management has the responsibility for monitoring road conditions and responding to situations of restricted access. Special concerns of the Clients regarding restoration of safe access to facilities are directed to the Facilities Manager for attention.

1.5. Hours of Coverage and Response Times

- The normal hours when the road maintenance service is conducted are 8:30 to 16:30 Monday through Friday. The specific days of the week and hours of the day dedicated to road maintenance activities vary, depending on the other assigned duties of the Operators.
- Response to road maintenance emergencies is provided on a 24/7 basis. For road blockage conditions, most typically caused by winter storms with heavy snowfall (more than 20 cm), the response to the site is within 4 hours or by 12:00 noon the day following a heavy snowfall that occurs during the night. The time required to clear and open the road depends on the severity of the conditions. When the cause of the blockage is a winter storm, the specific protocols of the Winter Operations Plan will govern the road clearing and opening activities.

1.6. Reporting

- The Service Provider informs the Clients about ongoing road maintenance activities via the regular Bi-Weekly Operations Report. This includes updates on routine maintenance and advisories about road work that may affect access to Client facilities.

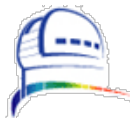


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- Reporting on access as affected by winter storms is in accordance with the protocols defined in the Winter Operations Plan.
- The cost for road maintenance service is tracked separately for the common Main Road and the sections that lead to Cerro Pachón and Cerro Tololo. Based on this cost accounting, fees are assessed to the Clients that reflect the cost to maintain access to the observatory site where their facility is located. This cost breakdown is presented to the Clients in the Annual Site Financial Report.

1.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of road maintenance performance:
 - Frequency of road resurfacing (number of months between reapplication of wearing surface on each kilometer of the main road).
 - Frequency of the defined maintenance regime for the paved roads, secondary roads and service roads (months between maintenance procedures).
 - Time in operation of major equipment (hours per month recorded on the integral meter of each piece of major equipment).
 - Number of road accidents or incidents per year in which a contributing factor is identified to be poor road condition, as determined by subsequent formal investigation by the safety professionals of the Service Provider and the Client Programs. (accidents/incidents per year)
 - Response time following winter storms or other events requiring emergency road maintenance. (time between notification of the event and start of clearing work on site)
 - Duration of road closures following winter storms (time of closure or restriction indexed to severity factors for the event).



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2. Common Electric Power Systems

Basic Purpose: To ensure an adequate, reliable, steady source of electrical power, with as little interruption as possible, as required for the operation of all Client facilities and all infrastructure and facilities maintained by the Service Provider on behalf of the Client programs.

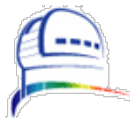
2.1. Definition of Maintained Power System

Common Mountain Electric Lines and Equipment:

- **Main Service Line:** The main service begins at a location near the control gate where there is a 23 kV, 3 phase power line from the commercial electrical utility company (CONAFE). The service is provided via an automatic recloser (feeder) which protects against a fault within the Medium Tension (MT) line. At the output of that feeder there is a metering device to record the consumption of power at the mountain sites. The overhead service supported on utility poles extends from that point of connection upward through the Quebrada San Carlos approximately 14 km to a point of bifurcation towards CT and CP. From the bifurcation the lines continue overhead, 4.5 km to CT and 14 km to CP, and terminate at disconnect devices at each of the two observatory sites. All elements of this main power line – conductors, poles and crossbars, insulators, lightning protection devices, disconnect devices, and other hardware – are considered to be part of the Main Service Line.
- **Main Transformation and Distribution:** At CT and CP there are primary transformers and distribution systems to points of connection at the dedicated switchgear and meter for each of the facilities of the Client Programs and for the Common-use Facilities. The primary transformer, secondary transformers serving more than one facility, conductors, protection devices and all other hardware before the point of connection at the switchgear for the Client or Common-use Facility are considered to be part of the main transformation and distribution system. At CT this also includes a motor generator set for conversion from 50 to 60 Hz and its associated hardware.

Common LS Recinto Electric Lines and Equipment:

- **Main Service Line:** The main service begins at a location at the west end of the LS Recinto on Avda. Cisternas where the 13.2 kV, 3-phase power line from the commercial electrical utility company (CONAFE) connects to a main service meter and disconnect devices. All elements of this main power line – conductors, poles and crossbars, insulators, lightning protection devices, disconnect devices, and other hardware – are considered to be part of the Main Service Line.
- **Main Transformation and Distribution:** At the location of the main connection there are main transformers mounted on the utility pole structure that provide power to all the Client and common facilities within the LS Recinto. From those transformers there are distribution systems to points of connection at the dedicated switchgear and meter for each of the facilities of the Client Programs and for the Common-use Facilities. The primary transformers, conductors, protection devices and all other hardware before the point of connection at the switchgear for the Client or Common-use Facility are considered to be part of the main transformation and distribution system.



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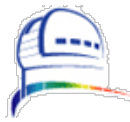
Common-use Back-up Power Generation:

- There are generator sets at each of the sites which provide back-up electrical power in the event of an outage of the main commercial power.
 - At CT there are common generators providing back-up power to all Client and Common-use facilities.
 - At CP there is a generator set that provides back-up power to the Common-use facilities (hotel, dining facility, communications equipment, etc.).
 - In the LS Recinto there is a generator set that provides back-up power to the Common-use Facilities of the Service Provider and the administrative support divisions of AURA.
- The maintenance and operation of these generators as well as their related transfer switches and other hardware is provided as a common service, the cost of which is distributed in proportion of connected use of the Client or Common-use Facilities served by the generators.
- The major Client facilities at CP also own and maintain their own back-up generators, which are not operated or maintained by the Service Provider, except as specifically requested and treated as Additional Work.

2.2. Scope of Service

Normal Routine and Preventative Maintenance

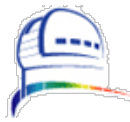
- **Regular Inspection and Monitoring:**
 - The on-staff electricians of the Service Provider regularly inspect the electrical equipment for evidence of damage, shorts, arcing, overheating or other indication of malfunction.
 - Electrical cabinets, meter boxes, switchgear and other equipment are periodically cleaned to remove dust and other foreign material.
 - Meters, displays and other monitoring devices integral to the electrical equipment indicating voltage, frequency, amperage and other relevant diagnostic data are regularly checked for any anomalous conditions that might indicate a potential problem with the main power equipment or the commercial feed.
- **Minor Part Replacement and Repairs**
 - Replacement of fuses, contacts, breakers, indicator lamps, and other ancillary hardware is undertaken promptly when defects, wear or malfunction is detected. A stock of frequently replaced parts such as fuses and lamps is maintained for that purpose.
 - Repairs to the physical structure of the equipment – cabinets, seals, access doors, latches and mounting hardware – is also undertaken promptly when defects are detected.
 - Electricians are alert for any needed maintenance and repairs to the facilities that house the electrical equipment and report these deficiencies to Operations Management. These repairs are undertaken by building maintenance personnel of the Service Provider or outside contractors as required.
- **Monthly Recording and Billing of Consumption**
 - Meters for each of the Client facilities and Common-use Facilities are read and recorded by the electricians once per month. This reading is taken at a point in time to correspond as close as possible with the reading of the primary meter at the service entrance, which is



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read and billed monthly by CONAFE. The readings from the Client meters are processed to include a distribution of line/transmission losses that correspond to the percentage of the total power consumed by the Client facility.

- This information is conveyed to the AURA-CAS to be processed for billings to the Client Programs. Due to the time required to read meters and post process the data into individual Client consumption charges, the monthly billings to the Clients are offset (delayed) one month from the billings of the commercial power provider.
- **Contracted line-maintenance**
 - Three times per year, approximately every 4 months, major preventative maintenance is performed on the mountain main service line by a contractor qualified and equipped to work on overhead medium tension power lines.
 - This work is normally performed over a 2-day period requiring the CT and CP sites to utilize back-up generators for power. The maintenance is done in sections working from both directions to minimize the down time.
 - The maintenance procedure is defined in the contract with the provider (currently ASEGIM Ltda.)
 - Trees are pruned back away from the lines.
 - Each of the poles is climbed by a qualified repair person to inspect and repair as necessary the insulators, cables and connecting hardware.
 - The insulators supporting the cables are inspected and wiped clean. When insulators are found to be damaged they are replaced. As an ongoing improvement campaign, a phased replacement of the ceramic insulators with a more durable polymeric type is in progress.
 - Copper cable ties are inspected and where necessary replaced.
 - Poles and cross bars are inspected and needed repairs are identified. Typically one of the periodic maintenance campaigns per year is devoted to the needed replacement of poles and other major work, instead of the full comprehensive line cleaning and inspection.
- **Service Connection Maintenance in LS Recinto**
 - Approximately once every 2 years preventative maintenance is performed on the LS Recinto main service connection by a contractor qualified and equipped for this work.
 - The maintenance procedure is defined in the contract with the provider (currently ASEGIM Ltda.)
 - The overhead supporting structure is climbed by qualified repair personnel to inspect and repair as necessary the insulators, cables and connecting hardware.
 - The insulators supporting the cables are inspected and wiped clean. Wherever damaged insulators are discovered they are replaced.
 - Copper cable ties are inspected and where necessary replaced.
 - Cross bars and other supporting hardware are inspected and needed repairs are performed.
- **Contracted Transformer Maintenance:**
 - Once per year contracted preventative maintenance including inspection and testing is performed on the main oil-filled transformers at CT, CP and the LS Recinto.
 - The level and operating temperature of the insulating/cooling oil is checked for compliance with specifications.
 - A sample of the oil is taken and tested for contaminants indicating potential breakdown of insulation, evidence of arcing, presence of water, and other contraindications.

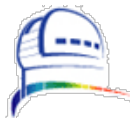


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- Oil is changed or other corrective measures are taken based on testing information.
 - Measurements are taken and evaluated of internal resistance of windings, resistance of terminals to ground, and other data indicating the condition of the internal components.
 - Diagnostic tests are performed to determine the potential cause of any anomalous readings.
 - A report is prepared describing the work done, the general health of the transformer and any recommendations for follow-up repairs.
- **Generator Set Maintenance**
 - The common-use generator sets are checked weekly by mechanics and electricians of the Service Provider. This includes checking fuel and oil levels, an operational start-up and test run, checking belt tensions, cleaning, general inspection, and logging hours of use as recorded on the integral meter of the generator.
 - More extensive contracted maintenance is undertaken regularly, based on the generator manufacturer's recommended maintenance per hours of use of the equipment. The contracted major maintenance, performed by a certified service provider for the make of the generator, consists of: changing oil, changing filters (fuel, air and oil), tune-up of engine operation, and other necessary work as defined by the contract and based on the manufacturer's specifications.
 - **Frequency Converter maintenance**
 - Maintenance of the frequency converter is symptomatic and includes analysis of vibration once per year.
 - Lubrication of the main axle bearings is done weekly.

Emergency Electrical Service Response and Repair

- In the event of outages of the main electrical power, the response by the Service Provider includes, at a minimum, the following actions:
 - Contact the Site Managers of the Client (or if at night the observing personnel) and supervisory personnel at the common-use facilities to determine the extent of the outage and to ensure that back-up generators have activated as needed to provide back-up power.
 - If the outage is determined to be general (affecting all mountain or base sites) contact is made by telephone with the designated technical representative of the commercial power company, CONAFE, to determine if there is a regional or sector outage. If so, obtain any relevant information about the nature and anticipated duration of the outage and convey that information to the Site Managers. Remain in regular contact with CONAFE regarding the extent of the outage and the anticipated restoration of service.
 - If the problem is not due to a commercial power outage, response to the scene by the electrician(s) and Operations Manager to locate the problem and take immediate necessary repair action.
 - Regardless of the cause of the power outage, the electric service line with a problem is isolated by opening appropriate connection devices so that it can be checked before reenergizing and so that the power can be restored to the facilities in a systematic fashion.
 - Cooperate with the Site Managers as required to assure a smooth transfer from generator back to commercial power, in accordance with the protocols of the Client Programs.



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- In the event of other electrical emergencies, or other system failures that require shut-off of power or other electrical intervention, the Service Provider responds as needed based on the degree of urgency and the particular circumstances of the event.

Additional Services

- Any electrical maintenance or repair services beyond the identified scope will be treated as Additional Services as previously defined. These available special services include:
 - Testing and repair of dedicated Client-facility electrical equipment.
 - Installation of electrical equipment in Client or common-use facilities
 - Assisting Client electricians with electrical repair or upgrade projects
 - Support of electrical installation required for the construction of new Client facilities

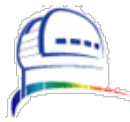
2.3. Dedicated Resources

Labor

- The Service Provider maintains 1.5 FTE (60 man-hours average per week) of Electricians, trained and certified to perform the scope of normal in-house services defined in this Agreement. Time of these Electricians is also dedicated to other activities. The employment, assignment, coordination and oversight of work performed by the Electricians are the responsibilities of Operations Management.
- Approximately 0.1 FTE of the time of Operations Management is dedicated to duties related to the electrical service.

Materials and Equipment

- The Service Provider maintains a stock of common replacement parts including: electrical cable, connectors, fuses, lightning protectors, insulators, etc.
- As these in-stock materials are used and replaced – and when special electrical materials are required for the services covered in this agreement – they are charged to the specific sector of the electrical service or common-use facility where they were installed.
- The Service Provider maintains a set of tools required to perform the covered services, including.
 - Electrical test equipment – meters, oscilloscopes, power supplies, and other field/bench test equipment.
 - Sets of general tools for electrical work the Mountain and in the LS Recinto.
 - Sets of tools for conduit bending and installation
 - Computers with necessary software for use by the electricians
 - Tablet and software dedicated for meter reading
 - Personal protection equipment for the electricians and others involved in electrical maintenance work
- 1 Pick-up truck (and other vehicles of the Service Provider as occasionally required) for transport of personnel and equipment to the required electrical maintenance areas.



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2.4. Service Requests

- The normal routine electrical maintenance activities are performed without the need for special request by the Clients. These services are conducted under the supervision of Operations Management. Concerns of the Clients regarding the performance of the routine electrical maintenance are directed to the Facilities Manager for attention.
- Electrical maintenance in response to power outages or other events of an emergency nature are also handled without special request, as Operations Management has the responsibility for monitoring the provision of the commercial and back-up electrical service and responding to any unusual occurrences. Concerns of the Clients regarding restoration of electrical power or response to other electrical emergencies are directed to the Facilities Manager for attention.

2.5. Hours of Coverage and Response Times

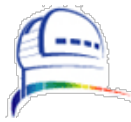
- The normal hours when the electrical maintenance service is conducted are 8:30 to 16:30 Monday through Friday.
- Response to electrical emergencies is provided on a 24/7 basis. For power outage conditions, the response to the site is within 4 hours or by 12:00 noon the day following a power outage that occurs during the night. The time required to restore power or perform other corrective action depends on the cause of the power outage or other emergency.

2.6. Reporting

- The Service Provider informs the Clients about ongoing electrical maintenance activities via the regular Operations Report. This includes updates on routine maintenance and advisories about electrical work that may affect power to Client facilities.
- The specific sectors of the main power service (service entrance to fork, fork to CP, fork to CT) are tracked separately for materials, labor and contracts dedicated to their maintenance. Based on this cost accounting, fees are assessed to the Clients that reflect the cost to maintain electrical power to the observatory site where their facility is located. This cost breakdown is presented to the Clients in the Annual Site Financial Report.
- With each monthly billing to the Clients, the Service Provider includes a breakdown of the full CONAFE billing and the basis for portion invoiced to each Client facility. This monthly billing report also quantifies the transmission loss and its distribution as well as the recent historical trend of the Clients electrical consumption.

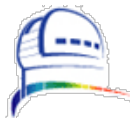
2.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of electrical maintenance performance:
 - Log of periodic preventative maintenance performed on electrical equipment. (dates and extent of performed maintenance)
 - Record of incidence (date, time and duration) of power outages for any reason and identification of those that were due to failure of infrastructure and equipment that is maintained under this Agreement.



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- Response time following power outages or other events requiring emergency electrical maintenance. (time between notification of the event and initiation of corrective work on site)
- Power quality measurement statistics. (monitoring and recording of: voltage levels, fluctuations, power factor, transmission losses).



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3. Water and Wastewater Systems

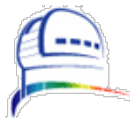
Basic Purpose: To supply treated potable water as required for the operation of all Client facilities and facilities maintained by the Service Provider on behalf of the Client programs. To provide a means of sanitary disposal of wastewater from connected Client facilities and common-use facilities, in compliance with all applicable regulatory requirements.

3.1. Definition of Maintained Water and Wastewater System

All elements of the main potable water supply, treatment and distribution system and the wastewater disposal systems described below – wells, pumps, tanks, piping, valves, regulators, chlorinators, filters, treatment plants, septic tanks, leach fields, and other related elements – are an integral part of the Water and Wastewater System that is maintained by the Service Provider, except as otherwise specifically noted.

Common Mountain Water and Wastewater Infrastructure:

- **Main Water Supply:** The main water supply service begins at a well in the Quebrada San Carlos from which water is pumped by means of a submersible deep-well pump. The water is accumulated in an above ground tank at the well site and pumped through 3-inch diameter, lined steel, underground piping approximately 5 km via a series of 3 pumping stations (with 1 pump in each) to three 200 cubic meter main water storage tanks (totaling 600 cubic meters) near the main telescope platform at CT. From there the water is treated to potable standards for use by the Client and common-use facilities.
- **Back-up Water Supply:** In the event of failure or required shut-down of the main well and supply system, water is purchased and trucked by the Service Provider from the commercial water provider, Aguas del Valle, in Vicuña, the closest municipality to the CT and CP sites.
- **Water Treatment:** The main water treatment system consists of filtration through granulated gravel, sand and charcoal with backwash and a gas-type chlorination system which produces potable water in compliance with Health Department standards. Further treatment for softening or other purification, as well as the heating or chilling of water, is the responsibility of the Client facilities per their own requirements.
- **Potable Water Distribution:**
 - Distribution on CT is primarily via underground piping with regulated gravity feed from the main tank to the point of connection and metering at the facilities that are at a lower elevation than the tank. For the CT facilities on the main telescope platform, above the water tank, the potable water is pumped into a hydropneumatic secondary tank that provides adequate pressure for distribution to the point of connection and metering at the facilities above.
 - Potable water is delivered to CP by the Service Provider in a tanker truck to a 200 cubic meter tank in the common CP service yard. From the point of connection and metering near the main CP water tank all pumping, distribution, secondary storage and any further treatment for use by the client facilities is the responsibility of the Clients.
 - Potable water distribution on CT and CP also serves for fire control, with fire hydrants installed in the main line adjacent to major facilities and a pumper truck stationed on CT.



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- **Wastewater Systems:**

- At CT there are a series of septic tanks and leach fields that are utilized by the common-use facilities as well as the Client facilities. These systems and the related main underground wastewater lines and inspection/clean-out boxes are maintained by the Service Provider.
- On CP each of the Client facilities maintains their own wastewater piping and individual wastewater treatment plants.
- For the common-use facilities (dormitories and kitchen) the necessary wastewater lines, inspection/clean-out boxes and treatment plant are maintained by the Service Provider as an integral part of the cost of providing the related services (lodging and meals).

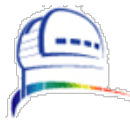
Common LS Recinto Water and Wastewater Infrastructure:

- **Main Water Supply:** The main water supply service begins at a well on the LS Recinto from which water is pumped by means of a submersible deep-well pump. The water is treated at the well site and pumped through 3-inch diameter PVC piping approximately 500 m to a 198 cubic meter main water storage tank at the top of the LS Recinto.
- **Back-up Water Supply:** At the main water storage tank there is also an available connection to the municipal water supply, Aguas del Valle, which serves the LS Recinto with potable water in the event of failure or necessary repairs to the internal well-fed system of the Service provider.
- **Water Treatment:** The main water treatment system which is located adjacent to the well consists of filtration through granulated gravel, sand and charcoal with backwash and a liquid-type chlorination system which produces potable water in compliance with Health Department standards. Further treatment for softening or other purification, as well as the heating or chilling of water, is the responsibility of the Client facilities per their own requirements.
- **Potable Water Distribution:**
 - From main tank at the upper (east) end of the LS Recinto the potable water is distributed by gravity feed and secondary pressurization to the Client and common-use facilities on the LS Recinto. Distribution on LS Recinto is primarily via underground piping of a varying type to the point of connection and metering at the served facilities.
 - Potable water is also distributed for fire control on LS Recinto by a separate pump and network of pipes, with hose cabinets provided at key locations around the compound.
- **Wastewater Systems:** On the LS Recinto there is an underground network of gravity flow wastewater piping and inspection/clean-out boxes for the disposal of wastewater from the internal fixtures and lines of the Client and common-use facilities. These lines flow to a common discharge point connecting to the municipal wastewater disposal/treatment system.

3.2. Scope of Service

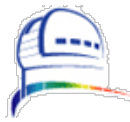
Normal Routine and Preventative Maintenance

- **Regular Maintenance of Potable Water Systems:**
 - The on-staff plumbers of the Service Provider regularly inspect the main potable water system equipment for evidence of deterioration, damage, leaks, or other indication of malfunction.



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- Meters, pressure regulators, valves and other control devices are regularly checked for proper functioning.
- Pumps and other mechanically intensive elements are regularly lubricated, cleaned and checked.
- Filtration systems are periodically backwashed and cleaned.
- Chlorination systems are regularly inspected and checked for proper operation and provision of correct concentration of chlorine in the water.
- **Minor Part Replacement and Repairs**
 - Repair or replacement of seals, filters, pipe fittings, valves and other ancillary hardware is undertaken promptly when defects, wear or malfunction is detected. A stock of frequently replaced parts is maintained for that purpose.
 - Plumbers are alert for any needed maintenance and repairs to the facilities that house the water service equipment and report these deficiencies to Operations Management. These repairs are undertaken by building maintenance personnel of the Service Provider or outside contractors as required.
- **Monthly Recording and Billing of Consumption**
 - Water meters for each of the Client facilities and Common-use Facilities are read and recorded once per month by personnel of the Service Provider. For reasons of efficiency, this is normally done in conjunction with the reading of the electric meters.
 - This information is conveyed to AURA-CAS to be processed for billings to the Client Programs based on the established cost/cubic meter for potable water at the different sites.
- **Water Transportation**
 - On a regular basis, approximately every two weeks, potable water is trucked by the Service Provider from the tank on CT to fill the main water tank on CP. The level of the tank is monitored regularly and the frequency of refilling is planned so as not to allow the level of water in the tank fall below 50%. This is to ensure that sufficient potable water supply is available to maintain safe hygienic conditions for personnel should the CP facilities be inaccessible for replenishing the water supply for a period of up to 2 weeks duration, due to winter storms or other adverse condition.
- **Water Quality Testing**
 - Once per week water samples are taken from the potable water systems at CT, CP and the LS Recinto. These are tested by the emergency medical staff on CT for percentage of chlorine and for potential development of coliform bacteria. Unacceptable levels of chlorine, or any evident development of bacteria, are immediately addressed.
 - Twice per year samples of the potable water from CT, CP and the LS Recinto are taken and sent to a laboratory for testing of all potability factors. Any results of that testing which indicate any parameters outside of potable water standards are immediately addressed.
- **Contracted Potable Water System Maintenance**
 - No outside contracted maintenance is regularly scheduled. When needs arise for extensive maintenance, repair or upgrade work to potable water systems, it is competitively bid and contracted. The costs of minor contracts and repair, which can be capitalized by the income from the per-use water fee, are included in the scope of this Agreement. In the event of the need for extensive repair, the Service Provider advises the Clients of the need to capitalize that cost by a mutually agreed upon distribution of the cost based on percentage of use.



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- **Contracted Wastewater System Maintenance:**

- Septic tanks that serve multiple facilities on CT and the treatment plant that serves the common-use facilities (dining and dormitories on CP) are pumped out by a commercial service as required, approximately every 6 months.

Emergency Water Service Response and Repair

- In the event of outages of the main water system, Site Managers or other responsible personnel are contacted at the Client and common-use facilities to determine the extent of the outage. If the outage is determined to be general – affecting a common-use facility or multiple facilities served by the common system – the Service Provider plumber(s) and Operations Manager respond to the scene to locate the problem and take immediate necessary repair action. If the failure is locally restricted to the Client facility, the Service Provider will cooperate with the Client to contract repair or directly dedicate resources subject to the terms for Additional Work.

Additional Work

- Special water and wastewater maintenance services, beyond the previously described scope, may be requested and funded additionally by the Client(s). In accordance with the scope and nature of the special services requested, the Service Provider may provide these services directly or may contract to an outside agency to be approved by the Client. These available special services include:
 - Testing and repair of Client facility internal water distribution and fixtures,
 - Installation of plumbing fixtures or equipment in Client or common-use facilities,
 - Assisting Client plumbers or client-contracted plumbers with repair or upgrade projects
 - Support of plumbing installation required for the construction of new Client facilities

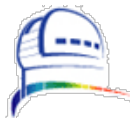
3.3. Dedicated Resources

Labor

- The Service Provider maintains 1 FTE (40 man-hours average per week) of Plumbers trained and qualified to perform the scope of plumbing work defined in this Agreement. Time of the Plumbers is also dedicated to other activities. The employment, assignment, coordination and oversight of work performed by the Plumbers are the responsibilities of Operations Management.
- Approximately 0.1 FTE of the time of Operations Management is dedicated to duties related to the water and wastewater services.

Materials and Equipment

- The Service Provider maintains a stock of common replacement parts including: piping, fittings, valves and other ancillary materials for the main types and sizes of piping that are required.



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- As these in-stock materials are used and replaced – and when special plumbing materials are required for the services covered in this Agreement – they are charged to the main water supply system or common-use facility where they were installed.
- The Service Provider maintains a set of tools required to perform the services, including.
 - Specialized Plumbing tools – pipe cutters, threaders and benders, pressure gauges, meters, and other installation/test equipment.
 - Sets of general tools for plumbing work on the Mountain and in the LS Recinto
 - Computers with necessary software for use by the plumbers
 - Personal protection equipment for the plumbers and others involved in water system maintenance work
- 1 Pick-up truck (and other vehicles of the Service Provider as occasionally required) for transport of personnel and equipment to the required water system maintenance areas
- 1 water truck with 20-cubic meter tank.

3.4. Service Requests

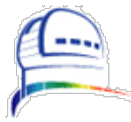
- The normal water and wastewater system maintenance and testing activities are performed without the need for special request by the Clients. These services are conducted under the supervision of Operations Management. Concerns of the Clients regarding the performance of the routine maintenance are directed to the Facilities Manager for attention.
- Water system maintenance in response to outages, major leaks or other events of an emergency nature are handled through immediate notification by the Client personnel or others discovering the problem to Operations Management of the nature and extent of the outage, leak or other condition. Concerns of the Clients regarding restoration of water service or response to other emergencies are directed to the Facilities Manager for attention.

3.5. Hours of Coverage and Response Times

- The normal hours when the water system maintenance service is conducted are 8:30 to 16:30 Monday through Friday.
- Response to water system emergencies is provided on a 24/7 basis. For outage conditions, the response to the site is within 4 hours or by 12:00 noon the day following a cut in water supply or a major leak that occurs during the night. The time required to restore service or perform other corrective action depends on the cause of the outage or other emergency.

3.6. Reporting

- The Service Provider informs the Clients about ongoing water system maintenance activities via the regular Operations Report. This includes updates on routine maintenance and advisories about plumbing work that may affect service to Client facilities.
- The main water supply system is tracked separately for materials, labor and contracts dedicated to its maintenance. Water system maintenance required for the common-use facilities is tracked as part of the cost of the service related to the facility. Water transportation to CP is tracked a separate cost. Based on this cost accounting, fees are assessed to the Clients that reflect the cost to maintain water supply to the observatory site

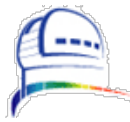


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where their facility is located. This cost breakdown is presented to the Clients in the Annual Site Financial Report.

3.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of water system performance:
 - Log of periodic preventative maintenance performed on water supply and treatment equipment. (dates and extent of performed maintenance)
 - Record of incidence (date, time and duration) of water outages or major leaks and identification the factors in the failure.
 - Response time following outages or other events requiring emergency maintenance. (time between notification of the event and initiation of corrective work on site)
 - Water quality statistics from weekly and semi-annual sampling and analysis. (level of chlorine and turbidity – weekly, full range chemical/physical factors for water quality according to Chilean Health Dept. – semi-annual.)



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4. Communications

Basic Purposes:

To provide the physical infrastructure necessary to accommodate data and telephone connectivity cabling and equipment. This equipment is installed and maintained by the Computer Infrastructure Services South (CISS) department of NOAO, under a separate Service Level Agreement.

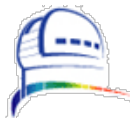
To establish and maintain a reliable network of radio communication throughout the CT and CP sites.

4.1. Definition of Maintained Communications System

Data/Telephone Physical Infrastructure:

- **Mountain Sites:** Data and telephone connectivity to the mountain sites is by microwave link. There is an antenna and transceiver equipment at the 4-m Blanco telescope at CT. From there the signal is repeated via microwave to a separate antenna located on a tower adjacent to a communications equipment enclosure on CP. There is also a backup antenna and connection point at the SOAR facility on CP operating at 10Mbs.
- **La Serena:** The microwave signal is transmitted and received to/from the mountain sites via an antenna at the Las Campanas Observatory compound in La Serena, where there is effective direct line-of-sight to CT. From the Las Campanas Observatory compound the signal is carried via a main fiber cable to communications equipment in the LS Recinto.
- **Distribution:** At all sites (CT, CP and LS Recinto) communication lines are run from the main connection points via fiber optic cables in underground conduits to all facilities requiring connectivity. From there the optical signal is converted to digital and conveyed via hardwired digital cabling and wireless routers to all required points of connection. All telephone lines are provided digitally via internet protocol (VOIP)
- **CISS Responsibility:** All antennas, microwave transmitters, switches, servers, cabling, routers, telephones, and other communication hardware and software are provided and maintained by CISS under the terms of a separate Service Level Agreement and other arrangements with the Client Programs. This does not include the hardware (e.g. telephones, routers, switches, etc.) within the Client facilities; as noted below under Client Responsibility.
- **Service Provider Responsibility:** The physical infrastructure that supports the communications network: conduits, connection boxes, enclosures for communications equipment, structural supports, electrical power and cooling are provided and maintained under this Agreement by the Service Provider.
- **Client Responsibility:** Within the Client facilities the communications hardware, software and the physical infrastructure that supports the communications network are provided and maintained by the Client.

Radio Communications System:



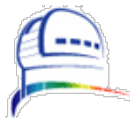
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- **Frequency Authorization:** AURA-O has an established agreement with the Chilean Ministry of Telecommunications, which grants the use of 4 specific frequency channels for local radio communications on the CT and CP observatory sites and roads. These channels are assigned for use by: 1) control gate and road safety; 2) CT telescope operations; 3) general operations; 4) SOAR telescope operations. For internal mountain operations Gemini utilizes their own set of radios on a different frequency, which have limited-range and operate at a power level that does not require government agency authorization.
- **Emergency Radio Stations:** Along the access roads to the observatories, at approximately 5-km intervals, the Service Provider maintains radio stations for use in calling for assistance in the event of an emergency situation where other means of communication is not available.
- **Vehicle Radios:** The vehicles that are owned and operated by the Service Provider, and which are utilized regularly at CT, CP and for transport from La Serena, are equipped with radios for use in reporting departures/arrivals, road condition information, and for general logistical communication. The Client programs that have vehicles dedicated for their own use on AURA roadways, pay for the purchase and installation of vehicle radios, as coordinated with the regulations and protocols established by the Service Provider.
- **Handheld Radios:** A set of handheld radios are purchased and maintained by the Service Provider for use by operations, maintenance and safety personnel for work-related communications. Clients are authorized to purchase a defined quantity of handheld radios for use within their programs. The quantity of radios for all users (Client and Service Provider) is defined by the terms of the frequency authorization described above.
- **Base Stations:** Radio base stations are maintained by the Service Provider at each of the main offices and common-use dining/lodging facilities.
- Antennas, repeaters, cabling and other hardware infrastructure for the radio communications system are maintained by the Service Provider.

4.2. Scope of Service

Data/Telephone Physical Infrastructure:

- **Normal Routine and Preventative Maintenance:**
 - The buildings and enclosures that house the communications equipment are maintained by the Service Provider as a part of the ongoing routine inspection and maintenance of all the NOAO/AURA facilities. This includes monitoring and ensuring the adequacy of electrical power and cooling required by the communications equipment.
 - The condition of communications conduits and connection boxes is monitored by the Service Provider and the CISS technicians who regularly utilize them. Repairs are undertaken by the Service Provider when defects are noted and reported that affect their serviceability.
- **New Installations and Expansions**
 - When additional communications cabling is required for new or existing facilities, the Service Provider works in conjunction with the requesting program or department to furnish and install the necessary conduits, connection boxes and mounting hardware to support the installation. For common use facilities the Service Provider undertakes the work directly. For communications service to or within the Client facilities, the Service



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Provider assists in the definition and specification of the supporting infrastructure. The material and labor cost for communications infrastructure for Client facilities is borne by the Client. The Service Provider may be requested to undertake the installation as an Additional Service.

- New enclosures or structures for the communications network are constructed or contracted by the Service Provider as required and as requested by CISS.

- **Monthly Billing Assistance**

- The Service Provider assists AURA-CAS as required in the determination of the internal departmental and Client monthly billings for telephone service. AURA CAS has the primary responsibility for these billings as well as for administering the basic contract for telephone service.

Radio Communications System:

- **Normal Routine and Preventative Maintenance:**

- The condition of radios and associated hardware is monitored by the Service Provider. Damaged or defective radios or other equipment are repaired or replaced as required by the Service Provider.
- Emergency radio stations on the access roads are periodically checked by the Service Provider. A full operational check of the radio, battery and solar charging system is done once per year, either directly by the Service Provider or by outside contract. This annual maintenance includes a transmission and reception level check of each radio station and repair or replacement of any defective equipment.

- **New Equipment:**

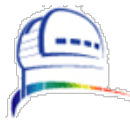
- Radios are purchased and installed by the Service Provider in new Operations vehicles and other common-use vehicles.
- Periodically handheld radios utilized by Operations are replaced with new ones as they are worn out by normal use.
- Improvement of the radio communications system, driven by physical expansion of facilities or advancements in technology, is undertaken by the Service Provider as deemed necessary and economically viable.

Additional Services

- Any work on communications systems or provision of communications equipment beyond the identified scope will be treated as Additional Services as previously defined. These available special services include:
 - Installation of communications infrastructure or equipment in Client facilities.
 - Assisting Client technicians with communications repair or upgrade projects
 - Support of communications installation related to the construction of new Client facilities

4.3. Dedicated Resources

Labor



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- The Service Provider employs Electricians and other technical personnel trained to perform the scope of normal in-house services defined in this Agreement. Approximately 8 man-hours average per week are dedicated to this work by personnel of the Service Provider. All personnel with duties related to the communications infrastructure also have other work responsibilities. The employment, assignment, coordination and oversight of work performed in support of the communications system is the responsibility of Operations Management.

Materials and Equipment

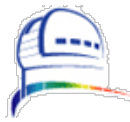
- The Service Provider maintains a set of tools required to perform the covered services, including.
 - Sets of general tools for electrical work, including tools for conduit bending and installation.
 - Test equipment for checking and troubleshooting radios and related equipment.
 - Computers with necessary software for use by the technicians
 - Personal protection equipment for personnel involved in communications maintenance.
- Vehicles for transport of personnel and equipment to the required work areas.
- Communications equipment shelter on CP and adjacent support structure for antenna.
- 8 solar-powered radio stations, consisting of: signage to highlight location, protective box, radio with antenna, battery, photo-voltaic panel to charge battery, post and supporting hardware.
- 30 (verify) handheld radios, (*type, power, range*)
- 60 (verify) vehicle radios (*type, power, range*)
- 4 (verify) base stations (*type, power, range*)
- The Service Provider maintains a stock of common replacement parts

4.4. Service Requests

- The normal routine communications service activities are performed without the need for special request by the Clients. These services are conducted under the supervision of Operations Management.
- Urgent repair of physical infrastructure of the data/telephone system are in response to requests to the Service Provider by CISS personnel who are the primary responders to data/telephone communications outages or other major failures.
- Urgent repair of radio communications system in response to outages or other events of an emergency nature are handled without special request, as Operations Management has the responsibility for monitoring the performance of the radio communications system and responding to any unusual occurrence. Concerns of the Clients regarding performance and/or restoration of the radio communications system are directed to the Facilities Manager for attention.

4.5. Hours of Coverage and Response Times

- The normal hours when the communications maintenance service is conducted are 8:30 to 16:30 Monday through Friday.



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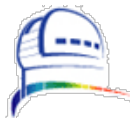
- Response to communications emergencies is provided on a 24/7 basis. For outage conditions, the response to the site is within 4 hours after notification of the failure or by 12:00 noon the day following a communications outage that occurs during the night. The time required to restore communications or perform other corrective action depends on the cause of the outage or other emergency.

4.6. Reporting

- CISS has the primary responsibility for informing Clients about connectivity-related communications issues
- AURA CAS has the primary responsibility for informing Clients about cost and billing-related communications issues.
- The Service Provider informs the Clients about ongoing communications infrastructure maintenance activities via the regular Operations Report. This includes updates or advisories about work that may affect communications connection to Client facilities.

4.7. Performance Metrics

- Extensive records of the reliability – and, conversely, the downtime – of the common data/telephone communications system are maintained and regularly reported by CISS.
- The Service Provider maintains records of needed repairs and regular maintenance of the radio communications system. These records are available to Clients on request.



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5. Security Service

Basic Purpose:

To safeguard personnel and property on AURA premises in Chile – at the mountain sites (CT and CP), on their access roads, and on the LS Recinto.

5.1. Definition of Provided Security Service

Administration and Technical Responsibility

- The security services are principally provided by means of an external contract administered by AURA-CAS on behalf of both the Service Provider and the Clients. The direct responsibility of the Service Provider with regard to security services is limited to:
 - Serving as the technical representative for management of the necessary contract,
 - Daily interactions with the personnel of the contracted service regarding routine security activities as well as any incidents or abnormal conditions,
 - Maintaining the security infrastructure (guard houses, gates, fences, etc.)
 - Informing the Clients regarding any special or abnormal security conditions.

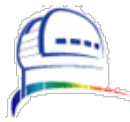
Definition of Sites under Security Control:

- **Mountain Sites:**
 - The 34,491-hectare (85,227 acre) AURA observatory property (*Estancia Totoral*) where the CT and CP observatory sites are located.
 - The Totoral observatory property is unfenced and has one main vehicle entry gate on the road entering the property from the highway (*Ruta 41*). The security service primarily includes controlling vehicular access through the entry gate and monitoring traffic on the observatory roads.
- **La Serena Recinto:**
 - The 13.3 hectare (32 acre) AURA compound in La Serena (LS Recinto) where the headquarters of the AURA Observatory programs are located.
 - The LS Recinto has a continuous perimeter fence and two actively used vehicular access gates. The security service primarily includes controlling access through the gates and security monitoring of roads and exterior areas within the LS Recinto.

5.2. Scope of Service

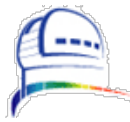
Mountain Sites:

- **Gate Control:**
 - The gate that provides vehicular access to the Mountain observatory site is staffed 7 days per week from 07:00 to 19:00 by a uniformed guard contracted by the Service Provider.
 - Incoming traffic: The guard verifies the authorization to enter of all personnel seeking to pass through the gate. This verification is by:



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- Recognition of personnel of the Service Provider, Clients, regular contractors of the Service Provider or Clients whose normal work requires access to the observatory sites and resident ranchers who are authorized to utilize property within the *Estancia Totoral*.
- Requesting identification (Chilean *carne*, driver's license, passport, or other government issued ID card) of visitors, contractors or other persons not personally recognized by the guard as having access permission.
- In the case of visitors, the guard asks the purpose and destination of their visit and verifies that they have obtained formal permission to enter observatory property from the Service Provider or Clients. The required permission form for each entering visitor is validated and signed by the guard and a copy is maintained at the guard house during their visit. Visitors may also be loaned a hand-held radio and/or GPS device to carry with them during their visit.
- In the case of the bus and shuttle transport services operated by AURA (see Section 10), the passengers are registered by other means, and the guard is not obliged to verify the identity of the passengers. The driver's identity is verified and all other security protocols are similar to any other vehicle.
- Once permission to enter is verified, the boom barrier (pivoting bar) is raised to allow the vehicle passage into AURA property and to the telescope sites via the access roads.
- Persons arriving at the control gate by means other than motorized vehicles (walking, biking, horseback, etc.) are subject to the same protocols for verifying entry authorization as required for persons in vehicles.
- Outgoing traffic: The guard notes and records the identity of the vehicle and driver and opens the boom barrier to allow them to pass. As required or specifically requested, the guard also notes and records outgoing loads, relays information to the drivers, and retrieves radios and/or GPS devices loaned to visitors.
- At the end of the guard shift (19:00), the boom barrier is placed in its lowered secure position by the guard and is padlocked into place.
- During non-shift hours (from 19:00 to 07:00), the guard remains at the gate house, but is off duty. The guard remains on-call by telephone. Attending to gate control or other security duties during non-shift hours is subject to overtime (see Additional Service). For reasons of labor law compliance and allowing the guard adequate rest period, this off-hours service is invoked only in exceptional circumstances.
- **Monitoring Road Traffic**
 - The guard at the mountain control gate monitors and records all traffic on the observatory roads, including the following procedures:
 - As vehicles are allowed to pass through the security gate (in accordance with the protocols described above) the time of entry, the AURA vehicle number, license number and description of non-AURA vehicles, and the identity of the driver are recorded by the guard in a daily traffic log.
 - The guard informs drivers entering the roads of any vehicles currently on the roads that they should expect to encounter, ongoing road maintenance work and any known adverse conditions. By radio the guard also informs other drivers already on the road of the entering vehicle.
 - All drivers using the observatory roads are required to inform the guard by radio when they have arrived at their destination and when they are departing for any other destination within the observatory compound. For this purpose all AURA vehicles are

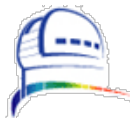


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- equipped with radios, and visitors are given hand-held radios, tunable to the road safety channel (see Section 4: Communications)
- For all departures and arrivals to/from different locations within the observatory sites the guard records the time and vehicle/driver identification in the daily traffic log.
 - This point-to-point tracking of vehicular movement on the roads serves to:
 - Verify that vehicles arrive safely at their destinations within an approximate expected time period. When vehicles do not report arrival within the approximate anticipated time, the guard checks by radio or telephone contact to their destination to see if they have safely arrived. If no verification can be obtained, the guard takes action to dispatch search personnel.
 - Verify that drivers are respecting overall speed limits on the observatory roads.
 - **Response to Emergency Situations:**
 - The guard at the mountain control gate performs the following functions in response to emergency situations:
 - In the event of notification of an accident on the observatory road, the guard immediately radios or telephones the on-duty nurse/paramedic at CT and/or CP depending on the location of the accident. The guard then calls the Mountain Operations Manager to report the accident, takes necessary follow-up actions as instructed, continues to monitor radio communications and directs any outside emergency responders to the location.
 - Under inclement weather conditions affecting the roads, the guard keeps the barrier closed pending instructions from the Operations Manager. The guard also posts signage at the side of the entry gate indicating the type of conditions that are in effect.
 - **Other Duties**
 - Post signage at the entry gate indicating road work, construction or other activities that drivers should be aware of.
 - Monitor radio communications from the guards at the LS Recinto.
 - Receive from the Service Provider and deliver to the shuttle and bus drivers mail and small packages for transport to the mountain sites.
 - Control access to the warehouse facility that is located adjacent to the gate house.
 - Relay information on request to/from rancher residents regarding observatory activities that may affect their use of the property.
 - Maintain the gate houses in a clean and orderly condition. Report any need for repairs to the building or infrastructure to the Operations Manager.

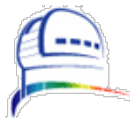
LS Recinto:

- **Gate Control:**
 - The two gates that provide vehicular access to the LS Recinto are staffed at all times (24/7) by a uniformed guard contracted by the Service Provider.
 - Incoming traffic: The guard verifies the authorization to enter of all personnel seeking to pass through the gate. This verification is by:
 - Recognition of personnel of the Service Provider, Clients or Residents of the LS Recinto, and regular contractors of the Service Provider, Clients, or Residents.



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- Requesting identification (Chilean *carné*, driver's license, passport, or other government issued ID card) of visitors, contractors or other persons not personally recognized by the guard.
- In the case of visitors unaccompanied by an AURA employee or resident, the guard requests the purpose of their visit and the identity of the person on the LS Recinto that they are visiting. The guard verifies that the resident or AURA employee has notified the guard service in advance by telephone that they are expecting the visitor. If no such visit has been registered, the guard attempts to verify by telephone that the person is expecting the visit. If no verification is possible by an AURA employee or resident, then the visitor is denied entry. If the visitor is confirmed to be expected by the recipient of the visit, then the visitor's information is recorded in the visitor log and the barrier is raised to allow the vehicle passage
- Persons arriving by means other than motorized vehicles (walking, biking, etc.) are subject to the same protocols for verifying entry authorization as required for persons in vehicles.
- **Outgoing traffic:** The guard opens the barrier to allow vehicles to safely pass, while maintaining the security procedures for any incoming vehicles concurrently at the gate. In the case of outgoing vehicles that are registered for AURA business use, the guard notes and records the identity of the vehicle and driver and asks their destination. That information is noted in a written log maintained for that purpose.
- During late night/early morning hours (approximately 00:00 to 07:00) a steel-lattice road gate is closed by the guard as an additional barrier to entry. During these hours that road gate is opened by the guard to allow incoming vehicles to approach the barrier, where the authorization procedures described above are carried out.
- During weekends and non-business hours during the week (19:00 to 07:00) the road gate is closed and locked at the LS Recinto gate that borders on the University of La Serena. This procedure is mandated by the neighboring University whose land is traversed by the access road leading to that gate. A guard remains at that gate during the periods of closure to keep the area secure and to monitor the mountain-contact radio which is located in that gate house (as described below in Other Duties).
- As requested by the Service Provider, the guard will also convey messages, correspondence, keys, or other packages to specific visitors or staff upon their arrival at the gate.
- **Security Rounds:**
 - One guard is assigned to make security rounds on a defined walking circuit throughout the LS Recinto.
 - Walking of the rounds is verified by an electronic device carried by the guard, which records proximity contact to fixed sensors located at key locations on the circuit, or by other reliable means.
 - Rounds are carried out in accordance with a defined schedule for each shift.
 - While making the rounds the guard is vigilant for any conditions that compromise the safety and security of personnel and property in the LS Recinto. Any such threatening conditions are reported immediately to the appropriate authority.
 - Other abnormal conditions noted by the guard during the rounds (water leaks, damage to infrastructure, suspicious or unexpected vehicles, etc.) are reported by the guard to the Operations Manager.



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- **Response to Emergency Situations**

- In the event of detection or report of a fire, vehicle accident, crime in progress, medical emergency or other situation demanding urgent attention, the guard immediately calls the appropriate first responders (police, fire department, ambulance) describing the nature and location of the incident and requesting immediate assistance. The guard then calls the Operations Manager to report the situation, follows any instructions and remains at the scene to assist as required. The guards at the control gates direct the emergency responders to the location.

- **Other Duties**

- Monitor radio communications from the mountain, listening for information about road conditions, accidents or other critical communications from the mountain sites.
- During non-business hours (18:30 to 08:00) Monday through Friday and on weekends, the phone line from the main reception desk (see Section 12, Reception Service) is transferred to one of the LS Recinto the gate houses. The guard receives calls from the public and others calling the reception number, informs callers of the business hours for the organization and responds as needed to any calls of an urgent nature.
- As requested by the Operations Manager and as part of the security rounds, check and report as required on specific equipment or infrastructure items (valves, generators, exterior stored materials, etc.)
- Receive from the Service Provider and deliver to the shuttle and bus drivers small packages for transport to the mountain sites.
- Receive and dispense keys to vehicles or hotel rooms according to instructions of the Operations Manager or other duly authorized personnel of the Service Provider.
- Maintain the gate houses in a clean and orderly condition. Report any need for repairs to the buildings or infrastructure to the Operations Manager.

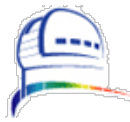
Additional Services (Mountain and La Serena as indicated)

- Any required afterhours (19:00 to 07:00) attendance by the mountain gate guard to the control gate.
- Providing security escort for visitors on AURA property.
- Providing additional guards to staff more than the defined number of gates in the LS Recinto.
- Special guarding of critical/valuable property or potentially dangerous areas beyond the normal vigilance on rounds or by other means described in the scope of services.

5.3. Dedicated Resources

Labor

- The Service Provider contracts with a qualified outside vendor for security service. The guards assigned to the service are certified for their duties by the law-enforcement authorities and properly trained to carry out the assigned activities. Training and certification of the guards is the responsibility of the Contractor.
- The Contractor dedicates approximately 2.5 FTE to the guard service for the mountain sites and 9 FTE to the guard service for the LS Recinto. Approximately 0.5 FTE are dedicated by the Contractor to supervising and administering the service.



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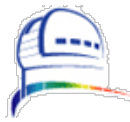
- Approximately 0.2 FTE of administrative staff members of the Service Provider and approximately 0.2 FTE of Facilities Operations Management are dedicated to activities related to the security services.

Materials and Equipment

- The Service Provider furnishes and maintains gate houses: one at the control gate to the mountain and two at the entry gates into the LS Recinto.
 - The mountain control gate house provides office/reception space as well as off-hours living space for the guards on weekly shifts (*turnos*). It includes:
 - Office with view of the road and gate, desk, chairs and other necessary furnishings,
 - Bedroom with bed, other furnishings and a closet,
 - Bathroom with toilet, sink and shower/tub,
 - Kitchen equipped for food storage and preparation,
 - Windows, lighting, heating, utilities and other requisites for habitability
 - The LS Recinto control gate houses provide interior weather-protected space for the on-shift gate guard to carry out their duties. They include:
 - An office with view of the road and gate, desk/counter and chair,
 - A closet for storage of uniforms and street clothes,
 - Bathroom with toilet and sink,
 - Lighting, heating and other requisites for comfortable daytime and nighttime use.
 - An additional modular gate house and a portable toilet is provided at an alternative temporary-use gate that is utilized for LS Recinto access when one of the two main gates is required to be closed during normal business hours.
- The Service Provider also furnishes and maintains:
 - Operable boom barriers and gates as required,
 - Radios, telephones and other communications infrastructure as required,
 - Computers as required for the performance of the security duties.
- Other personal equipment and provisions are provided by the Contractor as an integral part of the service, including: guard uniforms, flashlights, personal protection equipment, and per diem for food and supplies at the mountain gate house.

5.4. Service Requests

- The normal routine security service activities are performed without the need for special request by the Clients. These services are conducted under the supervision of Operations Management.
- Reporting of anticipated visitors to the LS Recinto is made at any hour of the day or night by telephone contact to the gate house.
- Authorization of visitors to the mountain is made during normal business hours (Monday through Friday 8:30 to 16:30 on CT, and 8:30 to 17:30 in the LS Recinto) by email or telephone contact to Operations Management in La Serena or CT. Authorization of visits for contractors may also be made through AURA-CAS.
- Special requests or concerns about security services are conveyed to the Operations Manager subject to the conditions of section VII of this Agreement – including the determination of a request to be of a High Priority or Routine nature.



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5.5. Hours of Coverage and Response Times

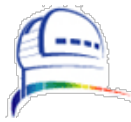
- The normal hours when the security service is conducted are:
 - Mountain Sites: 07:00 to 19:00, every day of the week
 - LS Recinto: 24 hours per day, every day of the week
- Response to security issues is provided by the guards at any hour of the day or night in the LS Recinto, and from 07:00 to 19:00 by the guard at the mountain gate. For safety emergencies, accident reports, weather alerts, and other urgent security needs, the guards in the LS Recinto may be contacted for issues related to the mountain sites. They in turn make the necessary notifications to the Operations Manager and emergency responders as required. The response and actions taken are immediate and appropriate to the nature of the request or reported incident.
- The normal hours of work for service staff of the Service Provider with responsibility to oversee the security service are 8:30 to 16:30 on CT and CP, and 8:30 to 17:30 in La Serena, from Monday through Friday.
- Requests or consultations regarding contractual administration of the security service are directed to the appropriate personnel of AURA-CAS during their normal business hours.

5.6. Reporting

- Records and logs are maintained by the guards as part of their normal scope of work as described above. They are reviewed regularly by the Service Provider and can be made available to the Clients on proper request.
 - Mountain sites guards maintain:
 - Copies of visitor authorization forms
 - Daily traffic log – indicating all movement of vehicles from point to point at the mountain sites.
 - Files downloaded from GPS devices carried by visitor vehicles
 - LS Recinto guards maintain:
 - Log of security rounds – indicating the date and time of the rounds, identity of the guard carrying them out, any special observations, reports of incidents or abnormal conditions noted.
 - Visitor log – indicating the date, time of arrival, and identity of all visitors, as well as their destination (person visited or purpose for the visit) on the LS Recinto.
- Information is conveyed via the regular Operations Report and other appropriate means to Clients, LS Residents, regular contractors and other users of the security services regarding change in status of gates, road conditions, or other special security related conditions.
- AURA-CAS has the primary responsibility for maintaining records regarding cost and billing for the contracted security service.

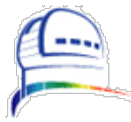
5.7. Performance Metrics

- Records are maintained by the Service Provider of all complaints, concerns and comments received from Clients, LS Recinto residents, and others regarding the security services.
- In particular, feedback is regularly sought from the Residents Advisory Committee regarding the quality of the security service in the LS Recinto.



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- Monthly meetings are held with management personnel of the security service Contractor, attended by representatives of AURA-CAS and Operations Management, to discuss recent security-related activities and any concerns about the service. Agendas and notes from those meetings are available as a record of issues raised and actions taken.



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6. Emergency Medical Service

Basic Purpose:

To provide competent, timely emergency response to accidents and urgent medical situations, and to perform other related activities intended to safeguard the lives and health of the staff of the Clients and Service Provider who work at the mountain sites (CT and CP).

6.1. Definition of Provided Emergency Medical Service

6.2. Scope of Service

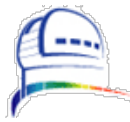
6.3. Dedicated Resources

6.4. Service Requests

6.5. Hours of Coverage and Response Times

6.6. Reporting

6.7. Performance Metrics



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7. Meal Service

Basic Purpose:

To provide regularly scheduled, nutritional satisfying and appetizing meals at CT and CP dining facilities (and take-out of night lunches) for personnel of the Clients and the Service Provider who work at or are visiting the mountain observatory sites as well as for visiting astronomers.

7.1. Definition of Provided Meals

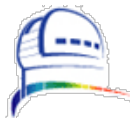
- All labor, materials, equipment, utilities and facilities required to prepare and serve 4 meals every day are provided by the Service Provider.
- There are four types of meals: breakfast, lunch, dinner and night lunch. A description of each meal is given below, including information on schedule, menu, and quantity of users accommodated.
- The breakfast, lunch and dinner service are cafeteria style self-service at the CT and CP dining facilities. Sufficient space and furnishings are provided to accommodate the anticipated number of customers.
- The quantity of persons served that is listed for each meal service is based on current demand. Any significant change in demand would impact the schedule – a significant increase would potentially require two shifts and would impact the resources required. (described in section 7.3)
- The schedules and menus for the meals may be subject to minor variation based on varying seasonal or logistical conditions and requirements.

Breakfast:

- **General Description:** Buffet-style continental breakfast
- **Schedule: Served from 8:00 to 8:30**
- **Available Standard Menu Items:**
 - Scrambled or fried eggs
 - Toast with butter, marmalade, jam
 - Sliced cheese and cold cuts
 - Pastries, pancakes or other sides
 - Cereal
 - Yogurt
 - Fresh fruit
 - Assortment of juices
 - Assortment of milk options
 - Coffee and tea
- **Approximate Capacity of Persons Served:** 40 at CT, 30 at CP *Verify by Mountain Ops*

Lunch:

- **General Description:** Executive-type lunch with two main menu options
- **Schedule: Served from 13:00 to 14:00**
- **Menu:**



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- Main dishes (2 options provided) –
beef, fish, casserole, pasta, pizza, hamburgers or other main courses
- Side dish – vegetables, French fries, empanadas, or other sides
- Bread
- Salad bar – with an assortment of vegetables and fruits that are in season
- Soup – chicken or beef soup, vegetable cream soup, consommé or other
- Dessert – cake, pie, pudding, flan, or other
- Drinks – Juice (min 2 types), milk, soft drinks, coffee, tea, water
- **Approximate Capacity of Persons Served:** 40 at CT, 30 at CP *Verify by Mountain Ops*

Dinner:

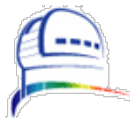
- **General Description:** Executive-type dinner with multiple menu options
- **Schedule:** 17:00 to 18:30
- **Menu:**
Same extent and variety as lunch, with different main dishes offered. One of the main dishes is usually the same for dinner and lunch on a given day, but it is prepared fresh for dinner, not leftover from lunch and warmed up.
- **Approximate Capacity of Persons Served:** 15 at CT, 10 at CP *Verify by Mountain Ops*

Night Lunch:

- **General Description:** Take-out “brown-bag” meal for consumption away from the dining facility.
- **Schedule:** Ordered in advance via a menu form. Forms are turned in by early afternoon to allow time to prepare the meals. Meals are picked up by the users at the dining facility.
- **Menu:**
 - Sandwich (1 or 2) – choice of type of bread, cold cuts, cheese, lettuce, tomato, avocado, peanut butter or jam
 - Soup (same as served at dinner time)
 - Cookies – choice of various types
 - Yogurt – choice of flavors
 - Beverage – milk, juice, soft drink
 - Fresh fruit
 - Users may also select a plate of food to-go from the normal lunch/dinner service
- **Approximate Quantity of Persons Served:** 10 at CT, 5 at CP *Verify by Mountain Ops*

General Conditions Applicable to All Meal Services:

- Per meal one serving of each menu item is offered as a basic part of the service. Second servings are offered, subject to quantity of food available.
- All standard condiments – salt, pepper, sugar, sweeteners, butter, cream, etc. – are provided.
- Accommodation of special dietary requirements is possible with 2 days advance notice.
- Fruit, cookies, bread, yogurt, drinks and other assorted snack food are available in the dining facility or adjacent lounges for self-service at any time during the day or night. This is intended as an off-hours self service for the users of the regular meal service.

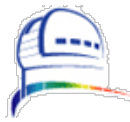


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7.2. Scope of Service

Provision of Materials

- **Food Procurement:**
 - The Head of Commissary Services of the Service Provider is responsible for determining the quantity and ingredients for the meal service and the quantity and assortment of beverages.
 - Ingredients and beverages for the meal services are purchased by the Service Provider through the AURA-CAS purchasing department.
 - Ingredients are purchased in large blanket orders for economy. Competitive prices are sought to control overall costs and help to reduce the price per meal. In some cases suppliers with products superior in quality, variety or freshness are chosen over other lower-cost suppliers.
- **Food and Beverage Transportation**
 - Food and beverages are delivered weekly to the dining facilities on CT and CP, in a dedicated, refrigerated transport truck.
 - Fresh bread is delivered daily to both dining facilities in a sealed container aboard the common passenger transportation vehicles that serve the mountain facilities.
 - Potable water for food preparation is provided through a metered connection to the water systems at CT and CP, (see Section 3, Water & Wastewater).
 - Bottled water for consumption is purchased and delivered in the same manner as the other consumables.
- **Menu Planning**
 - The menus for the meals are established on a monthly basis by the Head of Commissary Services.
 - The menus are based on a set of nutritional and caloric standards which were established in consultation with a certified nutritionist contracted by the Service Provider. These standards take into account the types of activities conducted at the observatory sites.
- **Meal Preparation**
 - Meals as defined by the menu are prepared fresh daily for every meal period.
 - Meal preparation conforms to all applicable standards of hygiene and food handling as defined by the Chilean Health and Sanitation Authorities.
 - Meals are prepared in the quantity required, as accurately as possible. Timely and accurate reporting by Clients of their normal and exceptional demand for meals, results in more economical preparation of food quantities.
- **Meal Service**
 - Meals are served cafeteria style in the dining facilities.
 - Cooks and Assistant Cooks attend the hot-food line and refill the serving containers of all main and side dishes when necessary.
- **Dishwashing and Facility Cleaning**
 - After each meal period, the kitchen staff washes the dishes, using a commercial-grade dishwasher, and the kitchen is cleaned.
 - All utensils, dishes and vessels used for food preparation and serving are cleaned in conformance with the hygiene standards defined by the Chilean Health and Sanitation Authorities.



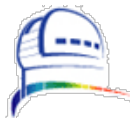
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- The janitors take all trash and waste material from the kitchen and dining facilities to a sanitary landfill on CT.
- **Management of Meal Service**
 - The Head of Commissary of the Service Provider administers and manages all activities directly related to the meal service.
 - Operations Management assists in the management of the meal service, interacting with the Clients, coordinating special requests, budgeting for the meal service, establishing meal prices, recording consumption and other administrative activities.
 - Oversight of safety and hygiene issues related to the meal service is provided by the *Comité Paritario de Seguridad e Higiene*, safety personnel of the Service Provider and applicable municipal authorities.
- **Recording and Billing of Consumption**
 - Electronic card readers are installed at the entrance to each of the 2 dining facilities. These card readers are programmed to read the standard identity cards that are issued to Client staff and visitors. For each meal, the users swipe their card in the reader, take the ticket and deposit it in a drop box located at the serving line.
 - If the card reader malfunctions or for any reason a ticket is not dispensed, the user signs a list, also located at the service line, giving name, type of meal, and program with which their presence on the mountain is associated (the latter is for accounting purposes only).
 - The electronic and written log of the meals is regularly transferred to an electronic spreadsheet by the Operations Management of the Service Provider and forwarded to AURA-CAS Accounting for monthly billing to the Client programs.

Additional Services

Any meal service beyond the identified scope will be treated as Additional Services as previously defined. These available special services include:

- **Service for Contractors**
 - Meal service for personnel of outside contractors of the Clients or the Service Provider is accommodated if requested with sufficient advance notice and subject to availability of space, material and labor.
- **Special Events**
 - Food service and catering for ceremonies, committee meetings, VIP visits or other special events are accommodated if requested with sufficient advance notice.
 - This may include, at the Clients request, table service, extra courses, or special entrees, desserts or snack service beyond the normal menu.
- **Conditions of Special Services**
 - To avoid overcrowding in the dining facility, contractor meal services and special events are generally scheduled at an hour or at a location different from that for the regular meal service.
 - Material, labor, coordination and management for special meal services are not included in the basic scope of services. These costs are treated as Additional Services.
 - Any special service should be requested at least two weeks in advance, specifying type and extent of meals, the number of meals and the duration of the service.



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7.3. Dedicated Resources

Labor

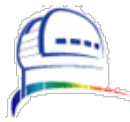
- The Service Provider employs 8 Cooks and Assistant Cooks and 1 Head of Commissary Services. On average approximately 360 man-hours per week are dedicated to this service, totaling about 10.5 FTEs.
- Cooks, Assistant Cooks and the Head of Commissary are trained and certified in the proper handling of food. They also have additional training as applicable to their duties.
- Several of the kitchen staff work a 8x6 shift to ensure 7 days per week coverage. A 8x6 shift consists of 8 days on shift alternating with 6 days off. Employers on a 8x6 shift stay on the mountain during their entire shift and lodge at the dormitory facilities
- Some of the kitchen staff work a regular day shift, commuting to the site Monday through Friday to allow flexibility in assignment, and to support the larger meal service needs during daytime in a regular work-week. .
- Approximately 0.5 FTE of janitorial service is dedicated to cleaning and maintenance of the kitchen and dining facilities at CT and CP.
- 0.2 FTE (one day per week) of a truck driver is dedicated to the transport of food from La Serena to the dining facilities on both mountains.
- Approximately 0.2 FTE of the time of Operations Management is dedicated to duties related to the meal service.

Materials and Equipment

- **Facilities:**

Buildings and related physical facilities are provided, outfitted, supplied and maintained by the Service Provider as required to accommodate the defined meal service at CT and CP. The Service Provider maintains all food preparation areas, dining areas and ancillary service areas in compliance with all requirements and regulations of the Chilean Health and Sanitation authorities. The facilities specifically include:

 - Food storage areas which are maintained as appropriate for the types of food being stored. This includes refrigerated and frozen food lockers, actively cooled to the temperatures required for storage of meat, dairy products, fruit, vegetables and other perishables. Twice a day temperatures of the refrigerators and freezers are checked and logged.
 - Commercial-style kitchens which are outfitted and maintained with a full set of commercial grade kitchen appliances, utensils and ancillary equipment, including:
 - Stoves and ovens
 - Food processors and mixers
 - Refrigerators and freezers
 - Steam-heated serving tables
 - Cutlery, spoons, spatulas, and other food preparation utensils
 - Separate food preparation counters for different food preparation tasks
 - Hoods and exhaust fans above stoves and at other required areas
 - Uniforms, caps, masks, aprons and other protective equipment for the kitchen staff
 - Computers with necessary software for use by the kitchen staff
(verify list of major kitchen equipment with Oscar Rivera)



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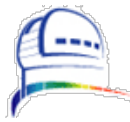
- The periodic replacement of appliances and equipment due to normal wear and tear is included in the scope of services covered in this Agreement. The provision of special equipment beyond this basic set is not included in the scope of services.
- Dining rooms are provided, outfitted and maintained by the Service Provider for comfortable accommodation of the maximum number users defined above for any given meal service. The outfit of the dining rooms includes:
 - Food service line with counters and containers for dishes and utensils as required
 - Dining tables and chairs
 - Trays, plates, glasses, utensils, and other service items
 - Self-service dispensers for water, juice and soft drinks
 - Refrigerated display cases for self service of desserts and snack foods
- Ancillary spaces (bathrooms, office, vestibules, dressing rooms, trash containers)
- **Food and Beverage Materials:**
 - The Service Provider maintains a stock of food, beverages and other ingredients. These in-stock materials are replenished as they are used and charged to the account of the corresponding dining facility.
 - An adequate reserve of food and beverages is continually maintained at the dining facilities to provide meals for up to 5 days in the event of unplanned emergency situation on the mountain.
 - Any costs associated with special events are charged to the program or department for which the special service is provided.
- **Utilities:**

The following utility services necessary for the meal service are provided and maintained by the Service Provider. Quantities are metered and charged to the corresponding dining facility.

 - Electricity
 - Telephone/data connection
 - Potable Water
 - LP Gas
 - Wastewater treatment
- **Refrigerated cargo truck**
 - 1 truck with a closed, refrigerated cargo compartment adequate for transporting food and beverages from their points of purchase to the mountain dining facilities is provided, maintained and operated by the Service Provider.

7.4. Service Requests

- The Client Programs annually inform the Service Provider of any anticipated change in demand for each meal type for the coming fiscal year.
- The Service Provider must be informed by phone or e-mail (to Head Cook at the dining facility) at least 4 hours in advance of any additional meals. . This notice may be by the Client's program administrators or by the customers themselves.



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7.5. Hours of Coverage and Response Times

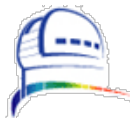
- The normal hours of work for the kitchen staff are 7:00 to 19:00 every day of the week.
- The dining facilities are open for meal service at the following hours:
 - Breakfast 08:00 to 08:30
 - Lunch 13:00 to 14:00
 - Dinner 17:00 to 18:30
 - Night Lunch can be picked up after 17:00
- Requests or consultations regarding general management of the meal service may be directed to Operations Management during normal business hours, 8:30 to 17:30 Monday through Friday. The initial response to such requests will be within 2 to 5 working days.

7.6. Reporting

- Monthly menus, service hours of the dining facilities and other information relevant to the meal service are posted prominently at the entrances to the dining facilities. This information is also available in electronic format.
- The Service Provider informs the Clients about any changes in meal service or other issues via the regular Operations Report. This includes updates on kitchen/dining facility maintenance and advisories of any work that may affect the Clients use of the dining facilities.
- Materials, labor and contracts dedicated directly and indirectly to meal preparation are tracked for each dining facility separately and meal prices are determined annually, based on a full cost recovery. At the start of the fiscal year the Clients are informed of the meal costs for the coming year. Relevant supporting financial information is presented in the Annual Site Financial Report.

7.7. Performance Metrics

- A record is kept by the Service Provider of the following information:
 - Purchase records and expiration dates for all food & beverages purchased, transported and stored.
 - Suggestions and comments collected in the suggestion & comment box located at each dining facility provided by the *Comité Paritario* (Workers Peer-Group Committee) at each work site. Comments regarding the meal service are conveyed to the Service Provider, acted upon appropriately and maintained as a record of special concerns and suggestions regarding the meal service.
 - Reports, recommendations and certifications of safety personnel and municipal authorities regarding the condition and operation of meal service facilities are maintained by the Facilities Manager and are available to the Client Representative upon request.
 - Any lapses or delays in meal service or other inability to serve the duly reported demand for a given meal are recorded.



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8. Lodging Service

Basic Purpose:

To provide reserved lodging at CT, CP and at the LS Recinto, for personnel of the Clients and the Service Provider as well as for visiting astronomers and other official visitors. The service is intended for customers whose work and schedule requires them to stay overnight, allowing them to sleep during either the night or day, depending on their work schedule.

8.1. Definition of Provided Lodging

- The Service Provider maintains a number of separate lodging facilities. These facilities are:
 - 1 hotel on the La Serena Recinto (**LS Hotel**)
 - 1 hotel on CT (**CT Hotel**),
 - 2 dormitories on CT – technicians and 10-unit (**CT Tech Dorm**, **CT 10-Unit Dorm**)
 - 5 houses on CT (**CT Houses**)
 - 1 hotel on CP (**CP Hotel**)
 - 1 20-unit dormitory on CP (**CP 20-Unit Dorm**)

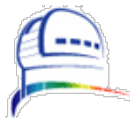
A description of these facilities, including location, primary users, type and number rooms, furnishings and amenities is given below.

- The use of the different lodging facilities depend on:
 - Duration of stay:
 - Short-term** (occasional stay, usually less than a week, but can be longer)
 - Long-term** (shift workers)
 - Diurnal/nocturnal work shift:
 - Night-sleepers** (daytime work activities)
 - Day-sleepers** (observing-related, nighttime activities)
- The hotel rooms are generally reserved for short-term visitors. Rooms furthest away from areas with noisy daytime activities are reserved preferentially for day-sleepers.
- The dormitories are mostly used by long-term shift workers. Day-sleepers occupy the wings furthest away from areas with daytime activities.
- The houses on CT are primarily used for groups of visitors working on a common project, visitors staying for a longer period of time and as overflow for the lodging facilities. Houses furthest away from areas with daytime activities are reserved preferentially for day-sleepers.
- Lodging facilities are provided for work-related purposes. Family members or personal visitors of staff may, in exceptional cases, stay overnight, providing the stay is authorized by Management of the Service Provider, and supported by the Client.

Description of Facilities

Standard Features of All Lodging Facilities:

- All bedrooms have: carpeted floors, smoke detectors, 110V power outlets (unless noted otherwise), individually controlled heating, an operable window with curtains or blinds, double or queen-size bed with sheets and blankets, a night stand, small writing desk, lamps and or ceiling/wall lights, closet or hanging rod, wired or wireless internet access.



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- All bathrooms have: tiled or vinyl floors, hot and cold water, toilet, wash basin, bathtub or shower with curtain or glass door, mirror, lights, controllable heater (unless noted otherwise).
- There is a parking area immediately adjacent to all lodging facilities. Paved and unpaved pathways lead to the other observatory facilities and to service areas in the vicinity of the lodging facilities.

Specific Features of Each Lodging Facility

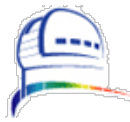
La Serena Hotel:

- The La Serena Hotel is a stand-alone building with 9 guest rooms, each with a separate entrance from an exterior covered walkway. The rooms have private bathrooms.
- Eight rooms are available for short-term users. One room is rented three nights by CT Telescope Operations for use by its members at the start or end of their week-long shift.
- A 10th room in the LS Hotel has been converted into a kitchenette and living room for use by the guests of the La Serena Hotel.
- The guest rooms, in addition to the standard features, have air conditioning and manually operated blackout shades.
- The kitchenette at the LS Hotel has work counters, double sink, 2 refrigerators, 4-burner stove, dishwasher, microwave oven, electric kettle, kitchen utensils, dishes, and silverware. The kitchenette is stocked with self-service breakfast and snack foods: milk, yogurt, eggs, cereal, bread, jam, butter, juice and bottled water.
- The living room has a dining table & chairs, lounge chairs, telephone, wireless and wired internet connection, satellite TV, lamps, bookshelves and other amenities.
- There is a laundry facility on the LS Recinto within walking distance of the LS Hotel. The laundry facility has washing machines and dryers, and may be used by LS Hotel guests.

Cerro Tololo Hotel:

- The CT Hotel consists of two wings with six guest rooms each. The rooms have private bathrooms, an exterior back patio, and are connected to the central dining facility by an exterior, covered walkway.
- These 12 rooms are principally used for short-term visitors – predominantly visiting astronomers and personnel of the Clients. Most of the guests are day sleepers.
- The guest rooms, in addition to the standard features, have electrically operated blackout curtains, a sliding door onto a small back patio, air conditioning, a telephone, cabled internet connection and a safe.
- There is a living room in the central area of the CT Hotel, adjacent to the dining room. The living-room is equipped with lounge chairs, couches, telephone, wireless internet connection, satellite TV, lamps, bookshelves and other amenities.
- There is a laundry facility, equipped with a washing machine and dryer, just outside the main entrance of the CT Hotel, in an exterior, covered area. This laundry facility is available for guests of all CT lodging facilities.

Cerro Tololo Technicians Dormitory:



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- The CT Tech Dorm is a stand-alone building consisting of a central hall and two wings. Each wing has eight guest rooms, with private bathrooms and an interior corridor connecting to the central hall.
- The 8 rooms in the wing closest to the access road are used by day-time technical and operational support staff of the Clients and Service Provider. The 8 rooms in the other, quieter wing are principally reserved for short-term use by day-sleepers, typically Client technical staff supporting nighttime telescope operations.
- There is an exercise room in the central hall of the CT Tech Dorm. This room is equipped with exercise bicycle, treadmill, free weights and bench, and a weight lifting machine. This facility is available for guests of all CT lodging facilities.
- The main living area of the central hall is equipped with lounge chairs, couches, satellite TV, telephone, wireless internet access, game tables, coffee maker, refrigerator and a communication radio base station.

Cerro Tololo 10-Unit Dormitory

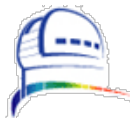
- The CT 10-Unit Dorm is a stand-alone building with 11 guest rooms – a central utility room was converted into a guest room giving the "10-Unit" Dorm one additional room. The rooms have private bathrooms and are entered from an exterior, covered walkway.
- The CT 10-Unit Dorm rooms are mainly reserved for long-term use by day-sleepers, typically Client technical staff supporting nighttime telescope operations.
- These guest rooms have manually operated black-out shades and individual heating units in addition to the standard features.
- The CT 10-Unit Dorm is near the CT Tech Dorm and has shared use of all the common areas in the central hall of the CT Tech Dorm.

Cerro Tololo Houses

- There are five houses on Cerro Tololo: three 2-bedroom houses and two 3-bedroom houses. The houses are detached units with exterior front and back entrances.
- These 5 houses with a total of 12 bedrooms are mainly used as overflow for short-term lodging of technical and telescope support staff, and for groups of visitors, often in support of a specific project. The houses are used both by daytime and nighttime sleepers, typically separating different shifts and work groups into different houses.
- In addition to the standard features the bedrooms have manually operated black-out shades, and can be equipped with one double bed or two single beds.
- Each house has one bathroom, which is shared by the guests of the house.
- The houses each have a living room, dining room and a kitchen with a work counter, sink, refrigerator, stove, and microwave oven.

Cerro Pachón Hotel:

- The CP Hotel is a linear building with 12 rooms along an interior hallway. This unit is connected to the entry lobby of the CP dining facility via an enclosed bridge and stairway.
- Eleven of the twelve rooms are in use as guest rooms: 9 are available for short-term users, e.g. Client observing staff and visiting astronomers, while 2 rooms are currently reserved for long-term use by one Client (SOAR) for observing support staff. The CP Hotel users are predominantly day-sleepers.
- The twelfth room is currently in use as a medical clinic.



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- In addition to the standard features, the CP Hotel rooms are equipped with telephone, air conditioning and manually operated blackout shades.
- In the middle of the CP Hotel is a common area with lounge chairs, couches, dining table and chairs, satellite TV, wireless internet access, communication radio base station and a polycom videoconference system.
- At one end of the common area is a kitchenette with counter, sink, microwave oven, coffee maker and a refrigerator stocked with self-service beverages and snacks.
- Next to the dining facility, at the lower level, is an exercise room with exercise bicycle, rowing machine, free weights and bench.

Cerro Pachón 20-Unit Dormitory

- The CP 20-Unit Dorm consists of 2 wings each with 10 rooms. A common living area connects the two wings. The rooms are accessed through interior hallways. Each set of 2 adjacent rooms shares a bathroom.
- 12 of the rooms are currently in use by Service Provider and for occasional use by Clients staff. The use is predominantly for night-sleepers, though some overflow use from the CP Hotel for day-sleeping observing personnel does occur.
- 8 of the guest rooms and the associated bathrooms are not currently in use. These rooms would require major maintenance and renovation prior to being put back in service.
- The central living area has a table, lounge chairs, TV and other amenities.
- There is a laundry facility in one of the wings equipped with washing machine and dryer, available for guests of all CP lodging facilities.

8.2. Scope of Service

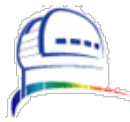
The lodging service includes all facilities, labor, materials, equipment, and utilities required by the Service Provider to operate and maintain the lodging accommodations at the 3 sites.

Administration, Reservation & Scheduling:

- Operations Management administers the long-term and short-term use of the lodging facilities, according to the requirements of the Clients and the Service Provider.
- Operations Management:
 - Programs and supervises the cleaning, laundry, housekeeping and maintenance activities;
 - Maintains adequate stock of cleaning supplies, soap, shampoo, beverages, snack foods and other consumables,
 - Prepares work orders for janitorial and maintenance staff as required
 - Schedules and coordinates outside contracts as required to support the lodging facilities,
 - Takes reservations requested by the Clients and assigns rooms
 - Prepares bills for short-term users at the end of their stay and reports charges for long-term users to AURA Accounting for billing to appropriate accounts.

Guest Check-in/Check-out and Billing

- Long-term users may check-in and check-out at any time of the day, usually at the beginning and end of their work shift. .



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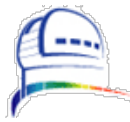
- Check-in for short-time users is after 12:00 pm on the arrival day; check-out is between 08:30 and 12:00 on the departure day. Exceptions to these times may be arranged with the Operations Management of the Service Provider, subject to demand for the rooms.
- Room keys for short-term users are delivered to them by different means depending on the facility and arrival time:
 - Guests of the LS Hotel receive the room key either at Reception or via the Clients Administration. For guests arriving after-office hours or during the weekend, room keys are left in the LS Recinto Guard house.
 - For all CT lodging facilities, keys are delivered to the user by the CT/CP Administrative Manager or by the Nurse on weekends or after-hours, both of whom have offices in the Round Office Building on CT.
 - For CP lodging facilities, keys are identified with the name of the user and placed on a rack in the central hall of each building.
- The billing and record of charges for short-term users is made by the Service Provider directly to the user at check-out, or immediately thereafter to the user's Client Program Administrator.
- The billing and record of charges for long-term users is regularly transferred to an electronic spreadsheet by the Service Provider and forwarded to AURA-CAS Accounting for monthly billing to the Client programs.

Housekeeping Service & Laundry

- Janitors of the Service Provider are responsible for cleaning the rooms and bathrooms of the motel, hotels, dormitories and houses.
- All occupied rooms are cleaned every three days. This service includes making beds, vacuuming carpets, emptying waste baskets, wiping down fixtures and furniture, and replenishment of soap, shampoo and bottled water.
- In addition to regular cleaning, every 3rd day of continuous occupancy bed and bath linen is changed.
- In the case of a 1 to 3-day occupancy the thorough cleaning and change of bed and bath linen is carried out immediately after departure and before the arrival of the next user.
- In addition to these services, users may request extra cleaning tasks by means of a cleaning request card placed on the room door.
- A clean supply of bed and bath linen is brought to the facilities every 2 days, and used linen is taken to the AURA Warehouse on the LS Recinto. Linen is laundered by an external contractor.
- The Janitors take all trash and waste materials from the lodging facility housekeeping to a sanitary landfill on CT for the mountain facilities, and to a central trash collection area in the LS Recinto.

Oversight of Maintenance and Repairs

- The Service Provider coordinates routine maintenance and minor repair of the lodging facilities.
- Major maintenance and upgrades of the lodging facilities are planned and supervised by the Facilities Manager and the Operations Manager of the Service Provider
- The CT/CP and LS Administrative Managers and Janitors are alert for any needed maintenance and repairs to the lodging facilities and report these deficiencies to Operations Management.



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Lodging-Related Car Rental

- 7 compact cars (6 at CT and 1 at CP) are available for rental to short-term users of the lodging facilities. These vehicles are for travel between the lodging facilities and the telescopes or other facilities within the observatory site (CT or CP). It is not allowed to drive these vehicles to and from CT and CP, nor on any other off-site location.
- Users are required to have a valid driver's license, to obey all traffic laws and to drive with appropriate care. Use of the rental cars may be restricted or prohibited under certain weather or road conditions.
- Rental cars are picked up at the Operations offices on CT and at the dining facility at CP. The Administrative Manager or their designee registers the user and delivers vehicle keys. At the end of the stay, the vehicle is to be returned at the same location and the condition of the vehicle and its accessories is checked.

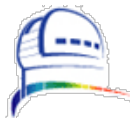
Additional Services

Any lodging services beyond the identified scope will be treated as Additional Services as previously defined. These available special services include:

- **Special Lodging Requests**
 - Lodging for VIP visits or special events requiring blocks of rooms or special services are accommodated, subject to availability of rooms. Such special requests must be made at least 4 weeks in advance, specifying the type of lodging required, number of guests and any special needs.
- **Lodging for Contractors**
 - Special block reservation of lodging accommodations for externally contracted work crews of Client programs may be arranged, subject to availability of rooms. The cost and service level of the required lodging are arranged with the Facilities Manager of the Service Provider at least 4 weeks in advance.
- **Repair of Damage**
 - Repair of any damage to the lodging facilities caused by the user that is beyond normal wear and tear is noted by the Service Provider. The extent of the damage is recorded and estimated, and an appropriate work order for repair is generated and billed to the Client as an Additional Service.
- **Conditions of Special Services**
 - Material, labor, coordination and management for special lodging services are not included in the basic scope of services and are considered Additional Services subject to the conditions of section VII-3 of this agreement.

8.3. Dedicated Resources

Labor



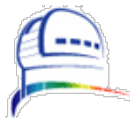
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- The Service Provider maintains 3 full-time Administrative staff members, who dedicate a significant portion of their work time to activities related to the lodging services, in total approximately 1 FTE.
- The Service provider maintains 4 full-time Janitors, who dedicate a large fraction of their time to cleaning and housekeeping of the lodging facilities, in total approximately 3 FTEs.
- In order to cover the lodging service on CT and CP, 2 of the Janitors at CT work 8x6 shift. The other two Janitors work a regular, Monday to Friday day shift, commuting daily to the site.
- The one Janitor for the LS Hotel works a Monday through Friday shift and dedicates approximately 0.8 FTE to the LS Hotel services.
- Maintenance and repairs of the lodging facilities require approximately 0.50 FTE (two days per week).
- Approximately 0.2 FTE (one day per week) of the time of Operations Management is dedicated to duties related to the lodging service.
- All Administrative personnel assigned to the lodging services are trained in cost & inventory control and other additional skills applicable to their duties.
- All Janitors are trained in sanitation, safety and security and any other applicable additional aspects of their work. This is primarily through on-the-job training.

Materials and Equipment

- **Facilities:**

Buildings and furnishings (as described in Section 8.1 above) are provided, outfitted, supplied and maintained by the Service Provider as required for the lodging services. The Service Provider maintains all lodging facilities in compliance with all applicable Chilean Health, Sanitation and Building-Safety regulations.
- **Consumable Materials:**
 - The Service Provider maintains an adequate stock of the following items related to the lodging Services:
 - Bed and bath linen, regularly replaced, remaining in service a maximum of 2 years.
 - Soap and shampoo provided in the bathrooms of all lodging facilities.
 - Beverages and snacks provided in the kitchenettes of the hotels and dormitories.
 - Cleaning products and implements as required for housekeeping and maintenance
 - As they are used or worn out, these in-stock materials are regularly replenished and charged to the account of the lodging facility where they are to be used.
- **Equipment:**
 - The Service Provider furnishes and maintains the required cleaning equipment including: vacuum cleaners, carpet cleaners, janitorial carts, brooms, mops, buckets and other implements.
 - 1 pick-up truck is dedicated to the transport of personnel and equipment related to the janitorial services for lodging facilities on CT and CP.
- **Utilities:**
 - The following utility services required for the lodging service are provided and maintained by the Service Provider.



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- Electricity
- Telephone service
- Potable Water
- LP Gas
- Wastewater treatment
- Consumption of these utilities is metered or otherwise recorded and charged to the accounts of the dormitory facility where they are used.

8.4. Service Requests

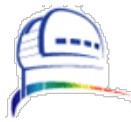
- To ensure availability of accommodations and to allow advance planning of lodging for all served programs, reservations for any of the lodging facilities should be made 4 weeks in advance of the requested occupancy. Subject to availability of rooms, exceptions may be made for shorter notice in cases of urgent visits or other occupancies without advance anticipation.
- Reservations may be made directly by the users, contacting the Administrative Managers of the Service Provider, or through the Client's Program Administrator. Visiting astronomers should coordinate with the administrator of the observing facility they will be using. Reservations require the name of the user, account to charge and method of payment.
- Clients are charged for long-term users on a monthly basis. Short-term visitors are billed before leaving the facilities or their Client programs are billed immediately thereafter.
- All hotel rooms are reserved and charged for a minimum of a 24 hr. (day/night) period. No hourly rate is possible, as rooms are fully cleaned between users.
- The Clients annually inform the Service Provider of the anticipated demand for lodging to support their mountain-based activities for the coming fiscal year. These estimates are used in combination with historic demands to budget for the upcoming fiscal year and to determine the cost per stay.

8.5. Hours of Coverage and Response Times

- The normal hours of work for the lodging staff are 8:30 to 18:00 on CT and CP, and 8:30 to 17:30 in La Serena, from Monday through Friday.
- Requests or consultations regarding general management of the lodging service are received by Facilities Operations Management in La Serena during normal business hours, 8:30 to 17:30 Monday through Friday. The initial response to such requests will be within 1 to 5 working days.

8.6. Reporting

- The Service Provider maintains daily, weekly and monthly records of on-site dormitory usage. This information is available in electronic format and can be sent to the Client by request of the Client Representative.
- The Service Provider informs AURA-CAS Accounting about lodging usage, Clients accounts, and means of payment, on a weekly and monthly basis.
- The lodging facilities accounts for CT, CP and LS Recinto are tracked separately for materials, labor and contracts dedicated directly and indirectly to lodging service. Based on

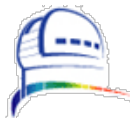


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this cost, lodging prices are determined annually to allow for full recovery by the Service Provider of the cost associated with the lodging service. The Clients are informed at the beginning of each fiscal year of the lodging costs for the coming year. Relevant supporting financial information is presented in the Annual Site Financial Report.

8.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of lodging service performance:
 - Record of all consumable and perishable materials procured and stored.
 - User comments and suggestions regarding the lodging services, when conveyed to the Administrative personnel of the Service Provider, are acted upon appropriately and maintained as a record of special concerns and potential improvements related to the lodging service.
 - Observer's night reports are also used to inform the Service Provider about issues on lodging. The daily review of this report is used to address facilities issues and to help maintain a record of service level and user satisfaction.



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9. Building Maintenance Service

Basic Purpose: To maintain the buildings, grounds and related facilities of the Service Provider in safe and serviceable condition as required to carry out the services defined in this Agreement. To provide facility maintenance and modification services to Clients as requested.

9.1. Definition of Maintained Buildings and Facilities

Service Provider Buildings and Facilities:

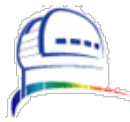
(Maintained as an integral part of providing the services that the facilities support)

- **Mountain**
 - CT workshops (carpentry, welding/mechanical, electrical)
 - CT garage
 - CT fuel tanks and pumps
 - CT warehouses and exterior storage areas
 - CT/CP utility enclosures (power house, pump houses, equipment shelters)
 - CT office building (ROB)
 - CT/CP emergency medical clinics
 - CT visitor lecture hall (at Blanco)
 - CT/CP kitchen/dining facilities
 - CT/CP hotels
 - CT/CP dormitories
 - CT houses
 - Control gate guard house and warehouse
- **LS Recinto:**
 - Carpentry and general work shop
 - Garage
 - Warehouses and exterior storage areas
 - Offices of the Service Provider in NOAO-S Building
 - Main Reception Lobby in NOAO-S Building
 - LS Hotel
 - Guard Shelters
- Common exterior grounds for Service Provider facilities, as identified on the site plan that defines the scope of the common landscaping contract.
- For further definition of the nature and purpose of the Service Provider facilities listed above, refer to Dedicated Resources subsection of each of the main Service Descriptions (section VIII) in this Agreement.

Client Buildings and Facilities for which Building Maintenance Services are Available:

(Maintained as specifically requested and charged on a per-use basis)

- Client Observatory Facilities
- Client Shops and Utility/Storage Facilities



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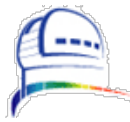
- Client Offices and Laboratories
- AURA Houses
- AURA Recreational Facilities
- Exterior grounds for Client facilities, defined as: exterior service areas dedicated exclusively to Client use; landscaped or patio areas that are directly adjacent to Client buildings; and identified as Client specific areas – outside the scope of the landscaping contract – on the site plan that defines the scope of that contract.

9.2. Scope of Service

- All of the following building maintenance, repair and modification services are performed for the Service Provider buildings and facilities as an integral part of providing the services that the facilities support. The required building maintenance services are tracked and charged to the specific service or department that utilizes the buildings.
- Building maintenance services are available for Client facilities on a per-use basis.
- The AURA houses on the LS Recinto demand extensive building maintenance services, which are provided on a per-use basis by the Service Provider charged to the AURA housing account or directly to the resident, depending on the nature of the work. Work on the AURA houses is also subject to the terms of the house rental contracts and other defined housing-related policies.
- With regard to the scope of service categories listed below:
 - Building cleaning, logistical support, routine maintenance and minor repairs are normally performed by staff of the Service Provider.
 - Major repair, modifications, additions, and exterior grounds maintenance are normally contracted to external companies under technical management of the Service Provider.

Exterior Grounds Maintenance

- Common exterior areas around the Service Provider facilities are maintained in safe, functional and presentable condition by outside contractors of the Service Provider.
 - Trees and bushes are pruned.
 - Grass areas are watered and mowed as required.
 - Roads and walkways are maintained free of trash, leaves and other debris.
 - Irrigation systems are maintained.
 - Trash and materials from landscaping work are removed from the area and properly disposed of off-site.
- Other specific grounds keeping services are as defined in the scope of the grounds keeping contract, and additional tasks are performed as specifically contracted by change order.
- Natural vegetation areas are not disturbed except as required to prevent overgrowth, surface water flow or other natural processes from impacting adjacent functional areas. Pathways are defined across natural areas for access as required.
- Conservation garden areas are defined and protected per established environmental mitigation requirements. Relocated and propagated plants are identified and tended.



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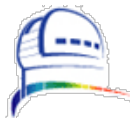
- Pest control, specifically extermination of rodent and insects, is performed by outside contract in both external and internal facility areas as required by the environmental conditions of the site and the activities performed in and around the facilities.

Building Cleaning

- Interior areas of Service-Provider buildings are regularly cleaned by janitorial staff or other employees of the Service Provider as required for the type of activities conducted in the building.
 - Office/lab areas have regular janitorial service including: emptying wastebaskets, vacuuming carpets, sweeping/mopping floors, wiping down surfaces, and cleaning windows.
 - Offices and other personal workspaces are thoroughly cleaned when an occupant moves out and before it is reassigned and occupied.
 - Shops and utility areas are maintained in a neat and orderly condition as required for safe efficient performance of the work that they support.
 - Kitchens and dining facilities are cleaned and maintained in a sanitary condition in accordance with applicable health regulations and as described in Section 7 (Meal Services)
 - Lodging facilities are cleaned as described in Section 8 (Lodging Services)
 - Houses are thoroughly cleaned between occupancies.

Routine Maintenance and Minor Repairs

- Utility systems, roofs, windows, doors, and other elements integral to buildings, are maintained in safe, functional condition. Minor repairs and replacement of materials or parts are undertaken as damage occurs or defects are reported.
 - Plumbing fixtures in bathrooms and kitchens are repaired as required. Leaks in water/gas piping are repaired, interior drain lines are unclogged or cleaned out, water heaters are maintained or replaced, valves are checked and adjusted.
 - Electrical fixtures are repaired as required, lamps in light fixtures are replaced, shorts/defects in building wiring repaired, electrical devices (breakers, outlets, switches, etc.) are replaced as required.
 - Appliances and furnishings integral to the buildings are repaired as required.
 - Heating, ventilation and air conditioning systems are repaired as required, filters are cleaned or replaced, fans/blowers are lubricated and serviced, valves and controls of gas-fired equipment are checked and adjusted, air conditioners are serviced and recharged.
 - Fire alarm systems (where required by the occupancy or use of the building) are periodically checked and maintained by Service Provider and repaired by contract as needed. In areas without fire alarm systems, stand-alone smoke detectors (and carbon monoxide detectors where necessary) are installed, periodically checked and maintained.
 - Windows and doors are maintained in operable condition, hardware is repaired or replaced.
 - Roofs are repaired as required when leaks are detected, shingles are patched or replaced, metal and asphalt roofs are patched, sealant is applied at roof penetrations.
- Interior and exterior finishes of buildings are maintained or refinished as required due to wear, damage or deterioration:
 - Asphalt felt roofs are periodically recoated with reflective protective coating.
 - Interior and exterior painted or varnished surfaces of buildings are refinished.



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- Ceilings are repainted or tiles replaced, hard ceilings are repainted.
- Floor finish materials are repaired or refinished, tiles (ceramic, wood, vinyl) tiles are replaced, carpets are cleaned periodically and replaced as needed.

Major Repair, Modifications or Additions

- Major repair or replacement of utilities, structure, and building equipment are undertaken when determined to be beyond rehabilitation by means of minor repair (as described above), in an advanced state of deterioration or unsafe. Major repairs include:
 - Reinstallation or upgrade of extensive electrical, mechanical and plumbing systems,
 - Removal and replacement of roofs (shingles, metal roofing, asphalt felt),
 - Replacement of fixtures, appliances, furnaces and other equipment integral to buildings,
 - Comprehensive renovation of building areas,
 - Full replacement of all windows or other upgrades for energy efficiency,
- Modifications or additions to facilities are undertaken as demanded by new functional requirements, organizational changes, or Client initiated and funded requests, including:
 - Remodeling of interior spaces,
 - Outfitting of existing building or exterior areas for new functional uses,
 - Additions to buildings or construction of new separate structures,
 - Relocation of modular structures or large building-related equipment.

Emergency Service

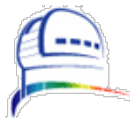
- In the event of facility emergencies (fires, gas leaks, major water leaks, dangerous electrical conditions, or building damage endangering personnel) the building occupants first call emergency responders (police, fire department) as demanded by the situation. In every case, the reporting person immediately notifies Operations Management by telephone, radio or in-person. For emergencies during non-business hours notification is to the guard of the Security Service (Section 5) who in turn immediately contacts Operations Management. The Operations Manager directs the appropriate response to the situation.

Other Duties

- Logistical support is provided for the utilization of facilities, including moving furnishings and equipment as required.
- Surplus furnishings and equipment are stored in warehouses or protected exterior areas and transported as needed for use in the various facilities.
- Service Provider personnel work with AURA-CAS in procuring new facilities equipment and materials and properly disposing of worn-out or waste materials and facilities equipment.
- In coordination with the exterior grounds maintenance work, site infrastructure is repaired as required by Service Provider staff, including: walks, retaining walls, lighting and signage.

Additional Services

- Any maintenance, repair or other building maintenance services beyond the identified scope will be treated as Additional Services as previously defined.



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- Labor for Additional Services from the building maintenance group is charged at the defined per-use hourly rate for building maintenance. Materials, outside contracts, equipment rental and any other ancillary costs are also included in the cost estimate developed for the work, in accordance with the general terms for Additional Services.

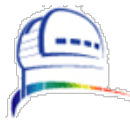
9.3. Dedicated Resources

Labor

- The Service Provider employs approximately 4.0 FTE of on-staff building maintenance personnel with skills in the necessary trades (electricity, plumbing, HVAC, carpentry, painting/finishing, masonry, general maintenance). The building maintenance group is staffed by 5 multi-skilled craftspeople, some of whom also have duties relating to other services.
- Approximately 0.4 FTE of the time of a Housing Coordinator (employed by AURA) is dedicated to duties related to the supervision and coordination of building maintenance per-use services for the AURA houses.
- The Service Provider employs 5.0 FTE of on-staff janitorial personnel to perform the building cleaning and other duties defined for building maintenance as well as for other services, particularly lodging and meal services.
- Outside contractors dedicate staff as required to comply with the scope of their contracts.
- Approximately 1.0 FTE of the time of Operations Management is dedicated to duties related to the building maintenance services.

Materials and Equipment

- The Service Provider furnishes and maintains workshops in the LS Recinto and on CT for carpentry, plumbing, electrical and other general work in support of the building maintenance services. These workshops include the following facilities:
 - Work areas with adequate dimensions and outfitting for repair and or construction of large equipment or pieces in work, overhead doors for access of large work pieces,
 - Standing/bench-mounted tools for working with wood, metal and other materials
 - Benches and areas equipped for plumbing and electrical work,
 - Air compressor, tank and lines for use of pneumatic tools,
 - Exterior material and equipment storage yards,
 - Storage and bench stock areas,
 - Office areas with desk, filing cabinets and other furnishings,
 - Bathroom with toilet, sink, shower and lockers,
 - Power, lighting, heating, gas connection and other utilities as required.
- The Service Provider maintains a stock of common plumbing, electrical parts and building hardware/materials. As in-stock materials are used and replaced or when special materials are required, they are charged to the specific service, user or Client of the building in work.
- The Service Provider maintains a set of tools required to perform the covered services, including:
 - Bench-mounted/standing woodworking tools: table saw, radial-arm saw, planers & sanders
 - Shop tools for working multiple materials: grinders, drill press, vises, sheet-metal breaks, band saw,



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- Sets of hand tools on CT and LS Recinto for carpentry and general building repair work,
- Sets of tools for exterior building work: shovels, picks, wheelbarrows, cement mixer, etc. (The grounds keeping contractor provides their own tools and equipment),
- Sets of tools on CT and LS Recinto for plumbing and HVAC work,
- Sets of tools on CT and LS Recinto for electrical work directly related to the buildings,
- Utility system diagnostic equipment, meters and other field/bench test equipment,
- Computers with necessary software for use by building maintenance personnel,
- Personal protection equipment for building maintenance personnel,
- 1 Pickup truck (and other vehicles of the Service Provider as occasionally required) for purchasing materials and transport of personnel and equipment to the service areas.

9.4. Service Requests

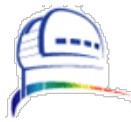
- Regular inspection and routine maintenance of the buildings of the Service Provider are performed without special request. For repairs and other non-routine attention to Service-Provider facilities, an interdepartmental report is made to Operations Management.
- Requests for repairs or non-emergency attention of any buildings and related facilities of Clients are made by means of the JIRA system for F&O. Requests for repairs or non-emergency attention of any kind to AURA houses are made by means of the JIRA system specifically dedicated to the AURA houses.
- Requests for immediate attention to building-related emergencies are made to Operations Management by telephone, radio or in-person. For emergencies during non-business hours notification is to the guard of the Security Service (Section 5) who in turn immediately contacts Operations Management.
- Any concerns regarding any of the above service requests or responses are directed to the Facilities Manager for attention.

9.5. Hours of Coverage and Response Times

- The normal hours for building maintenance services are:
 - For CT and CP 8:30 to 16:30 Monday through Friday.
 - For the LS Recinto 8:30 to 17:30 Monday through Friday
- Response to building emergencies is provided on a 24/7 basis. Any necessary response to urgent situations is directed by the Operations Manager.

9.6. Reporting

- Operations Management utilizes a work order system to manage all work performed by the building maintenance group and to account for all labor, materials, contracted services, and equipment dedicated to specific jobs. Building maintenance expense records are submitted to AURA-CAS on a monthly basis and are available upon appropriate request of the Client Representative.
- Work orders executed on a per-use basis result in direct billing of Clients for the work or charges to the appropriate Client account. Work orders executed in support of F&O services result in charges to the appropriate F&O account for the supported service. AURA-CAS has



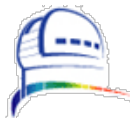
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the primary responsibility for maintaining records of charges for building maintenance services.

- Records of work performed on the AURA houses are maintained by the Housing Coordinator.

9.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of building maintenance performance:
 - A record of complaints and responses to building-related issues in Service Provider facilities (lodging, dining facilities, houses)
 - A record of safety inspections of facilities as performed by NOAO safety officers and the AURA peer-group committees (*Comités Paritarios*) for the different sites.
 - JIRA-based records of building maintenance/repair requests and actions/time taken to resolve them.



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10. Transportation Service

Basic Purpose: To provide regularly scheduled transportation to and to/from the LS Recinto to/ from the CT and CP sites for personnel of the Clients and the Service Provider. The transport service is intended for staff and visitors whose observatory-related work requires them to travel to the Observatory summits, affording them safe, timely transportation to perform their missions and job functions on the mountains.

10.1. Definition of Provided Transportation Service

Administration and Technical Responsibility

- The common transportation services, bus and carryall, are provided through external contracts administered by AURA-CAS on behalf of both the Service Provider and the Clients. Reservations for transportation are managed through a self-serve on-line system and each of the served programs has administrative personnel assigned to assist transportation users with their arrangements as required. Therefore, the scope of responsibility of the Service Provider with regard to transportation services is therefore limited to:
 - Serving as the Technical Representative for management of the necessary contracts
 - Informing the clients regarding any special or abnormal conditions in the transportation services
- Further detail regarding scope of this service is defined below in Section 10-B.

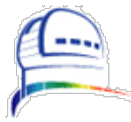
Transportation Route:

- The CT & CP sites are approximately 86 km east of La Serena, at an altitude of 2,200 & 2,700 above sea level, respectively. These mountain sites are accessed via the public highway (*Ruta 41*) and private unpaved observatory roads maintained by the Service Provider (see Section VIII-1 of this Agreement).

Transportation Demand:

- Approximately 40 staff members of the Clients and the Service Provider commute Monday through Friday to work on both mountains (15 to CT and 25 to CP).
- Approximately 20 to 25 employees work weekly (7x7) shifts and require transportation to and from the CT and CP at the beginning and end of their work shift.
- A varying number, on average 20 per month, of visiting astronomers, engineers and technicians require transportation to the CT and CP sites to observe or for other telescope-related activities.
- The number of vehicles and their capacity is based on current demand as indicated above. Any significant change in demand would impact the resources required as described in section 10.3, and the schedule – potentially requiring additional vehicles, higher-capacity vehicles, or additional scheduled runs.

Service description



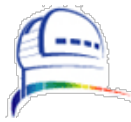
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- For transportation of the users described above, AURA contracts the following services:
 - A 38-seat bus makes one roundtrip daily from La Serena to CP and back, Monday through Friday (except holidays). CT passengers get on and off the bus at El Quisco junction to take alternative transport from there on to CT and back.
 - An 11-seat carryall makes 2 round-trips daily from La Serena to CT and CP and back, Monday through Saturday and one round-trip on Sunday.
- 5-year contracts were granted in 2013 to Buses Hualpen for the bus service and to West Ltda. for the carryall service. These contracts stipulate requirements for type of vehicle, safety provisions, exclusivity of equipment and driver, schedule and other terms.
- The current itineraries of the bus and carryall are described in the tables below:

| Bus Itinerary Monday through Friday | | | | | |
|-------------------------------------|--------|--------|---------------------|--------|--------|
| LA SERENA to SUMMIT | | | SUMMIT to LA SERENA | | |
| | Arrive | Depart | | Arrive | Depart |
| La Serena (at Gemini Bldg.) | | 6:30 | Pachón | | 16:30 |
| Quisco | 7:55 | - | Quisco | 16:55 | - |
| Pachón (Dining/Gem/SOAR) | 8:20 | | La Serena | 18:20 | |

| Carryall Itinerary Monday through Friday (early run) | | | | | |
|--|--------|--------|---------------------|--------|--------|
| LA SERENA to SUMMIT | | | SUMMIT to LA SERENA | | |
| | Arrive | Depart | | Arrive | Depart |
| La Serena (at Bodega) | | 8:00 | Pachón | | 11:30 |
| Tololo (Las Tacas/Office) | 9:35 | 9:40 | Tololo | 12:05 | 12:10 |
| Pachón (Dining/Gem/SOAR) | 10:15 | | La Serena | 13:45 | |

| Carryall Itinerary Monday through Friday (late run) | | | | | |
|---|--------|--------|---------------------|--------|--------|
| LA SERENA to SUMMIT | | | SUMMIT to LA SERENA | | |
| | Arrive | Depart | | Arrive | Depart |
| La Serena (at Bodega) | | 15:15 | Pachón | | 17:30 |
| Tololo (Las Tacas/Office) | 16:50 | 16:55 | Puerta | 18:05 | 18:10 |
| Pachón (Dining/Gem/SOAR) | 17:30 | | La Serena | 19:45 | |



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Carryall Itinerary Saturday (early run)

| LA SERENA to SUMMIT | | | SUMMIT to LA SERENA | | |
|---------------------------|--------|--------|---------------------|--------|--------|
| | Arrive | Depart | | Arrive | Depart |
| La Serena (at Bodega) | | 8:30 | Pachón | | 11:00 |
| Tololo (Las Tacas/Office) | 10:05 | 10:10 | Tololo | 11:35 | 11:40 |
| Pachón (Dining/Gem/SOAR) | 10:45 | | La Serena | 13:15 | |

Carryall Itinerary Saturday (late run)

| LA SERENA to SUMMIT | | | SUMMIT to LA SERENA | | |
|---------------------------|--------|--------|---------------------|--------|--------|
| | Arrive | Depart | | Arrive | Depart |
| La Serena (at Bodega) | | 14:15 | Pachón | | 16:30 |
| Tololo (Las Tacas/Office) | 15:50 | 15:55 | Puerta | 17:05 | 17:10 |
| Pachón (Dining/Gem/SOAR) | 16:30 | | La Serena | 18:45 | |

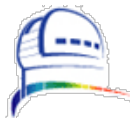
Carryall Itinerary Sunday (only run)

| LA SERENA to SUMMIT | | | SUMMIT to LA SERENA | | |
|---------------------------|--------|--------|---------------------|--------|--------|
| | Arrive | Depart | | Arrive | Depart |
| La Serena (at Bodega) | | 10:00 | Pachón | | 12:15 |
| Tololo (Las Tacas/Office) | 11:35 | 11:40 | Tololo | 12:50 | 12:55 |
| Pachón (Dining/Gem/SOAR) | 12:15 | | La Serena | 14:30 | |

10.2. Scope of Service

Administration and Supervision

- The contracts for transportation services are executed and administered and by AURA-CAS. The Service Provider acts as AURA's Technical Representative for the contracts, monitoring operation of the transport services, and verifying general compliance with the contract requirements.



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Reservation & Scheduling:

- A contractor-developed and maintained online system is provided for all transportation users to make their own reservations, either directly themselves or with the support of the administrative personnel of their department. Administrative Assistants for the Client programs utilize the online system to make standing reservations for their staff who regularly commute to and from the mountain on the bus. The Service Provider acts as the AURA's Technical representative to the reservation system contractor.
- Designated Representatives of the Client Programs and the Service Provider confer as needed to consider any schedule changes for improved convenience, seasonal time-change, etc. Any required changes are coordinated with the Contractor(s) by AURA-CAS.

Record Keeping & Billing

- The record of transportation service utilization is maintained by administrative personnel of the Service Provider by means of the online reservation system, describing passenger and program.

Additional Services

- Any transportation services beyond the identified scope will be treated as Additional Services as previously defined. These available special services include:
 - Otherwise non-programmed transportation for special events or visits may be arranged through the administrative staff of the Service Provider.
 - Transportation for personnel and/or equipment of external contractors working on projects for Clients or the Service Provider.
 - Special transport for fragile, extremely critical, oversized, heavy or otherwise exceptional cargo.
- Any such special requests are required to be submitted with sufficient advance notice, normally at least 2 weeks, or more time as necessary for requests involving special vehicles or logistics. All requests need to specify, at a minimum, the date/times, type of cargo, number of passengers and destination(s), as well as the appropriate account to be charged.

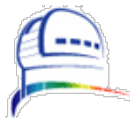
10.3. Dedicated Resources

Labor

- 3 Administrative staff members of the Service Provider dedicate a portion of their work time to activities related to the transportation services. The total commitment of administrative time is approximately 0.5 FTE.
- Approximately 0.2 FTE of the time of Facilities Operations Management personnel is dedicated to duties related to the transportation service.

Equipment and Materials

- **Vehicles:** Specification of the standard transport vehicles (bus and carryall) including safety equipment, age, capacity, acceptable manufacturers, and special provisions are stipulated in



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the AURA contracts. All required maintenance and repair of the transport vehicles is the responsibility of the contractor.

- **Fuel:** The fuel for the bus is included in the contract. The fuel for the carryall is provided separately by AURA and charged to the carryall account.
- **Roads:** The Observatory roads are maintained by the Service Provider as required to ensure safe conditions for transit of the specified vehicles. (See section VIII-1 of this Agreement)

10.4. Service Requests

- The Client Programs annually inform the Service Provider of the anticipated demand for the personnel transportation services for the coming fiscal year. This estimated demand serves as a presumed comprehensive annual request for the corresponding quantity of rides.
- Transportation system users of the Clients and Service Provider make their own reservations with the support, as required, of the administrative personnel of the departments that correspond to their program.

10.5. Hours of Coverage and Response Times

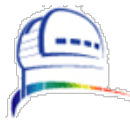
- The normal hours of work for transportation service support staff of the Service Provider are 8:30 to 16:30 on CT and CP, and 8:30 to 17:30 on La Serena, from Monday through Friday.
- Requests or consultations regarding general management of the transportation service are to be directed to the appropriate personnel of AURA-CAS for administrative issues and the Operations Manager for technical issues.

10.6. Reporting

- The Service Provider maintains records of transportation usage. This information is available to the Client by request of the Client Representative to AURA-CAS.
- Each of the transportation accounts are tracked separately for contractor charges, fuel and NOAO-S labor dedicated directly to the transportation service. The Clients are informed at the beginning of each fiscal year of the projected transportation costs for the coming year. Relevant supporting financial information is presented in the Annual Site Financial Report.

10.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of transportation service performance:
 - The record of transportation service utilization, as maintained through the on-line reservation system indicating quantity of passengers on each of the scheduled trips, provides an indication of the convenience, timeliness and suitability of the service for the needs of the potential users.
 - Users comments and suggestions regarding the transportation service are conveyed to the Service Provider, acted upon appropriated and maintained as a record of special concerns and suggestions regarding the transportation service
 - The mountain Guards (see Security Service – Section 5) maintain a record of the arrival times of the scheduled transport vehicles at each programmed stop. These records serve to verify on-time performance of service.



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11. Garage Service

Basic Purpose: To maintain AURA fleet vehicles (as defined below), all heavy machinery and trucks, and all common-use generators in safe, serviceable and reliable condition.

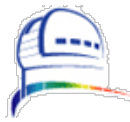
11.1. Definition of Maintained Vehicles and Equipment

Fleet Vehicles:

- **Service Provider:** Approximately 11 pickup trucks and 1 utility passenger vehicle are utilized by the Service Provider for general transport of personnel and materials and for specific purposes in provision of the services defined in this Agreement. Maintenance of these vehicles is treated as an integral part of the services to which their use is dedicated.
- **Mountain Lodging Rental:** Approximately 7 compact cars are available to users of the mountain lodging facilities for self-transportation from location to location on CT or CP. Maintenance of these vehicles is treated as an integral part of the lodging service (Section 8)
- **AURA Rental:** Approximately 15 vehicles are available for use by AURA, primarily for rental to visitors and expatriate staff resident in Chile. These are mainly compact and midsize passenger/utility vehicles. Maintenance of these vehicles is per specific request of AURA and treated as a per-use service.
- **Client Programs:** The Client programs purchase and register through AURA approximately 30 vehicles to serve their specific requirements. These are mainly pickup trucks, utility vehicles and passenger cars. Maintenance of these vehicles is per specific request of the Client program and treated as a per-use service.

Heavy Equipment and Special-Purpose Vehicles:

- **Heavy Machinery, Large Trucks and Special Purpose Vehicles:** A set of heavy machinery and special purpose mobile equipment is maintained for use by the Service Provider and in the execution of the services. Maintenance of these pieces of equipment is treated as an integral part of the specific services to which its use is dedicated. This equipment includes:
 - Flatbed trucks (2) Ford 350
 - Flatbed low-boy transport truck (2)
 - Refrigerated food transport truck
 - Water truck
 - Fire truck (pumper)
 - Ambulances (2)
 - Fork lifts (5)
 - Mobile boom crane
 - Road graders (2)
 - Bulldozer
 - Front-end loaders (2)
 - Dump truck



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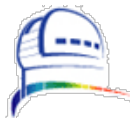
Common-use Electric Generators:

- Back-up electrical generator sets powered by diesel engines are located at each of the sites to provide electricity in the event of an outage of the commercial power. The engines and major mechanical parts of these generators are maintained by the garage in cooperation with the common electric service maintenance (Section H-2). Maintenance of the back-up generators is treated as an integral part of the power generation service. This equipment includes:
 - CT generator (750 KVA) for all Client and common-use facilities.
 - CP generator (150 KVA) for the common-use facilities (hotel, dining facility, ALO)
 - CP generator (15 KV) for communications shelter and previous dining facility (use TBD)
 - LS Recinto generator (250 KVA) for the common-use facilities of the Service Provider and administrative support divisions of AURA.
- The major Client facilities at CP have their own dedicated back-up generators, which are not maintained by the Service Provider, except as specifically requested and treated as Additional Services.

11.2. Scope of Service

For Fleet Vehicles

- **Regular Inspection and Routine Maintenance:**
 - All vehicles licensed for public road use are inspected by the garage mechanics of the Service Provider (garage) preparatory to their annual *Revisión Técnica* as required by the Chilean Ministry of Transportation and Telecommunications. That inspection and certification process includes the following:
 - Pre-check of all critical safety systems subject to inspection by the authorities,
 - Performing any necessary minor repairs or adjustments,
 - Transporting the vehicle to and from the inspection station,
 - Repair of any defects or malfunctions detected in the *Revisión Técnica*,
 - Reception and filing of the documentation certifying the vehicle as roadworthy.
 - Routine periodic preventative maintenance is performed by the garage for all vehicles that are utilized directly by the Service Provider to carry out the services described in this Agreement. Routine maintenance is available for the other fleet vehicles (Client programs, AURA) on a per-use basis. Routine maintenance includes the following, performed approximately annually or as otherwise noted:
 - Engine performance check and timing with engine analyzer – 5,000 km or 6 months,
 - Engine tune up (including spark plug change),
 - Replacement of filters,
 - Oil change – periodically per manufacturer's mileage recommendations,
 - Check, refill/change fluids (transmission, brake, antifreeze) – as required,
 - Check and adjust brakes,
 - Check electrical systems (battery, alternator, starter, lights, fuses),
 - Check safety equipment (seat belts, air bags, emergency kit),
 - Wheel balancing and alignment – as required,
 - Check cooling systems (radiator, thermostat, fan, belt),
 - Check fuel system (pump, hoses, fuel injection system or carburetor),
 - Check dashboard equipment and indicator lights/sensors,

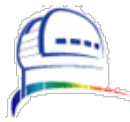


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- Check and recharge air conditioning (if applicable) – as needed.
- **Minor Repairs and Replacement of Parts:**
 - Minor repairs and replacement of worn or damaged parts are performed by the garage for all vehicles and mobile equipment utilized by the Service Provider. These services are available for the other fleet vehicles (Client programs, AURA) on a per-use basis. Minor repairs and replacements includes the following:
 - Replacement of tires, belts, hoses, brake pads, seals, shock absorbers and other parts subject to wear due to normal use,
 - Minor engine work including replacement of gaskets, spark plugs/wires, fuel injectors,
 - Repair or replacement of cooling system components (radiator, thermostat, water pump)
 - Repair or replacement steering and alignment system components, (tie-rods, CV boots, power steering booster, wheel bearings or other components),
 - Repair or replacement of electrical system components (starter, alternator, battery, cables/wiring),
 - Replacement of broken or cracked windows,
 - Repair of minor body damage or exterior accessories,
 - Repair of interior upholstery and accessories,
 - Minor repairs or replacement of parts are generally performed directly by the garage. In some cases, however, for effective management of garage time and resources, minor repair work is contracted by the garage to external providers.
- **Major Repairs:**
 - Major repairs and replacement of major vehicle components are performed by the garage for all vehicles and mobile equipment utilized by the Service Provider. These services are available for the other fleet vehicles (Client programs, AURA) on a per-use basis. Major repairs and replacements include the following:
 - Overhaul of engine including: replacement of rings, valves, machining of block/head assemblies,
 - Replacement of complete engine or major parts (block, head, manifolds, etc.)
 - Replacement or major overhaul of transmission,
 - Major repair of drive/suspension system, main bearings, differential,
 - Repair of accident damage to body or frame,
 - Major repairs are generally contracted by the garage to external providers. In some cases they may be performed directly by the garage mechanics subject to availability of adequate labor and equipment.

For Heavy Equipment and Special-Purpose Vehicles

- **Regular Inspection and Routine Maintenance:**
 - Routine periodic maintenance is performed by the garage for all heavy and special-purpose mobile equipment utilized by the Service Provider. Routine maintenance includes the following, performed at appropriate intervals based on the use of the equipment tracked in kilometers or hours:
 - Engine tune up and performance check,
 - Replacement of filters,
 - Oil change – periodically per manufacturer's recommendations,



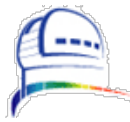
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- Check and refill fluids (transmission, brake, coolant),
 - Check of all major systems (brakes, electrical, cooling, fuel) as described above for fleet vehicles,
 - Replacement of blades for road grader,
 - Check hydraulic systems (lifting mechanisms, bucket/blade actuators, etc.)
 - Check control/safety systems (lights, indicators, sensors),
 - Check and recharge air conditioning (if applicable).
- **Repair and Replacement of Parts:**
 - Repair and replacement of worn or damaged parts are performed by the garage as required for the safe reliable operation of all heavy and special-purpose mobile equipment utilized by the Service Provider, including the following:
 - Replacement of tires, belts, hoses, brake pads, seals and other parts subject to wear,
 - Engine repair or overhaul including machining of block/head assemblies,
 - Replacement of engine, transmission, or other major components,
 - Repair of accident damage,
 - Repair or replacement of components of major systems (cooling, electrical, fuel, steering, etc.),
 - Replacement of broken or cracked windows,
 - Repair of upholstery and accessories in the equipment cabin,
 - Repairs to heavy and specialized equipment are performed directly by the garage mechanics or contracted by the garage to external providers in accordance with the nature of the work and the availability of adequate labor and equipment.

For Common-use Electric Generators

See Section VIII – subsection 2.1, Common-use Back-up Power Generation, for the definition of which generator sets are considered common-use as opposed to program-specific (Client) generator sets.

- **Weekly Service:**
 - The common-use generator sets are checked weekly by the garage in coordination with electrical service (Section VII-2). This weekly service includes:
 - General inspection and cleaning,
 - Checking fuel and oil levels,
 - Checking belt tensions,
 - Operational start-up and test run.
- **Periodic Contracted Maintenance:**
 - More extensive contracted maintenance is undertaken regularly, in accordance with the generator manufacturer's recommended maintenance program based on hours of use of the equipment. The contracted major maintenance, performed by a certified service provider for the make of the generator, consists of:
 - Changing oil,
 - Replacement of filters (fuel, air and oil),
 - Tune-up of engine operation,
 - Other necessary work based on the manufacturer's specifications.



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For Acquisition and Retirement of Vehicles

- The garage outfits newly acquired vehicles and mobile equipment as required for their intended use, including the following tasks:
 - Assistance in the licensing process (for vehicles to be driven on public roads),
 - Application of appropriate AURA insignia and vehicle number identification,
 - Installation of a VHF radio (for vehicles to be used for mountain transportation),
 - Installation (normally by contract) of roll-bar, bed liner, and other safety/utility items,
 - Provision of safety kit (fire extinguisher, flashlight, tools, tire chains)
- When vehicles are retired from the fleet due to age and/or condition, the garage performs the following:
 - Cleaning and preparation as required prior to auctioning,
 - Removal of VHF radios and other special equipment for fleet use,
 - Assistance to AURA-CAS Property Officer in the auctioning process,
 - In the case of vehicles being retired due to major accident damage, assistance in determining and carrying out the appropriate disposition (auction for salvage, retention storage for parts, etc.)

Emergency Service

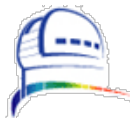
- In the event of accidents or on-the-road breakdowns of fleet vehicles, the driver or other person on the scene is required to radio or call the control gate for assistance. The guard at the control gate in turn contacts the appropriate emergency responders and Operations Management. The immediate response is to dispatch the appropriate emergency responders and/or a vehicle to safely transport the driver, any passengers and critical cargo to the mountain facilities or the LS Recinto. The garage subsequently arranges for the vehicle that is damaged or in need of repair to be towed or driven to the garage or appropriate shop facility.
- Urgent repair of heavy machinery or special-purpose equipment is solicited by immediate notification by the operator to the Operations Manager who contacts the garage to determine and direct the appropriate response.
- In the event of mechanical failure of a back-up generator the Operations Manager contacts the garage and electrical service personnel and directs their coordinated response.
- The response to all emergency situations involving vehicles, other mobile equipment, or the generators is treated as a High Priority service request as defined Section VII 3-e.

Other Duties

- The garage provides a vehicle and driver and to pick up and drop off the mail daily at the La Serena Post Office, coordinated with the reception service (Section 12).
- The garage provides a driver for the weekly transport of food and beverages to the mountain dining facilities, coordinated with the meal service (Section 7).
- As AURA-fleet rental vehicles are returned, the garage checks, cleans and prepares them for the subsequent rental.

Additional Services

- Any maintenance, repair or other garage services beyond the identified scope will be treated as Additional Services as previously defined. These available special services include:
 - Special detailing or modification of vehicles,
 - Mechanical work on other powered equipment (compressors, hoists, etc.)



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- Work on any vehicles or mobile equipment not defined in Section 11.1 (contractor vehicles, external rentals, etc.)
- Road-side assistance or repair of rented AURA vehicles
- Repair of damage caused by accidents to rented vehicles
- Labor for Additional Services from the garage is charged at the defined Per-Use hourly rate for garage time. Parts and any special equipment required are also included in the cost estimate developed according to the general terms for Additional Services.

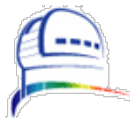
11.3. Dedicated Resources

Labor

- The Service Provider employs 2.0 FTE of mechanics, trained and certified to perform the scope of the garage services. One of the mechanics is the Head of Garage Services and works mainly in the administration, outside procurement, coordination and reporting of the work. The other mechanic principally performs the maintenance and repair work.
- Approximately 0.5 additional FTE are dedicated specifically to driving tasks included in the garage services.
- Approximately 0.2 FTE (1 day per week) of the time of the equipment operators is dedicated to duties related to garage services.
- Approximately 0.1 FTE of the time of Operations Management is dedicated to duties related to the garage services.

Materials and Equipment

- The Service Provider furnishes and maintains two vehicle maintenance garages: the main service garage in the LS Recinto and an auxiliary garage on CT. These garages include the following facilities:
 - Overhead doors for vehicle access,
 - Vehicle work bays (6 bays in LS garage, 4 bays in CT garage),
 - Vehicle hoist (in LS garage)
 - Pit for working under vehicles (in CT garage)
 - Benches and equipment stands,
 - Air compressor, tank and lines for use of pneumatic tools,
 - Office with desk, filing cabinets and other furnishings,
 - Mezzanine bench stock area,
 - Bathroom with toilet, sink, shower and lockers,
 - Vehicle wash rack (LS garage)
 - Power, lighting, heating, gas connection and other utilities as required.
- The Service Provider maintains a stock of common vehicle parts. As these in-stock materials are used and replaced or when special parts are required, they are charged to the specific service, department or Client to whom the vehicle or equipment under repair is assigned.
- The Service Provider maintains a set of tools required to perform the covered services, including:
 - Portable hoists, jacks and other remotely deployable equipment,
 - Engine analyzers and test equipment,
 - Specialized tools for automotive work,
 - Sets of general tools for mechanical work on at the LS Recinto and CT garages,
 - Computers with necessary software for use by the mechanics,



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- Personal protection equipment for the mechanics and others involved in garage services
- 1 Pickup truck (and other vehicles of the Service Provider as occasionally required) for purchasing repair parts and transport of personnel and equipment to the garage service areas.

11.4. Service Requests

- Regular inspection and routine maintenance of vehicles and equipment do not require special request. They are performed by the garage according to defined maintenance periods and vehicle mileage.
- Requests for incidental repairs or other garage services are made by the Clients or departments to Operations Management or directly to the Head of Garage Services.
- Garage services in response to emergencies (vehicle accidents, equipment failure or other) are handled without special request by the Client or department. The Operations Manager has the responsibility for directing any appropriate response by the garage to these situations.
- Any concerns regarding any of the above service requests or responses are directed to the Facilities Manager for attention.

11.5. Hours of Coverage and Response Times

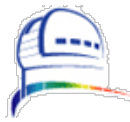
- The normal hours for garage services are 8:30 to 17:30 Monday through Friday.
- Response to vehicle/equipment emergencies is provided on a 24/7 basis. Any necessary response by garage personnel to urgent situations is directed by the Operations Manager.

11.6. Reporting

- The Head of Garage Services utilizes a work order system to manage all work performed by the garage and to account for all labor, materials, contracted services, and equipment dedicated to specific jobs. Garage expense records are submitted to AURA-CAS on a monthly basis and are available upon appropriate request of the Client Representative.
- Work orders executed on a per-use basis result in direct billing of Clients for the work or charges to the appropriate Client account. Work orders executed in support of F&O services result in charges to the appropriate F&O account for the supported service. AURA-CAS has the primary responsibility for maintaining records of charges for garage services.
- Records are maintained by the garage of the hours/mileage of equipment/vehicle use.
- For on-road vehicles, documentation is maintained of the annual *Revisión Técnica*.

11.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of garage service performance:
 - Downtime of vehicles – time in maintenance or awaiting repair.
 - Records of age and condition of vehicles as a means to gauge their expected vs. achieved reliability, and as a guide to when they are no longer viable for use.
 - Downtime of generators and a record of the type of failure – mechanical or electrical – resulting in failures.



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12. Reception Service:

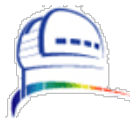
Basic Purpose: Provide a centralized point of reception for general public, in-person visits, telephone calls and correspondence to all Client programs, AURA departments, and NOAO-S departments (including the Service Provider) who have offices on the LS Recinto.

12.1. Definition of Provided Reception Service

- The reception includes the following activities, performed during normal business hours:
 - Receiving and orienting visitors at a central reception lobby in the NOAO-S building of on the LS Recinto.
 - Answering phone calls and emails and forwarding/redirecting to Clients or departments of NOAO-S as appropriate,
 - Receiving and distributing mail to the Clients, the departments and staff of NOAO-S, and to residents of the LS Recinto. This service includes daily pick-up of mail from the La Serena post office and sorting/routing the mail for delivery to the addressees.
 - Dispatching and receiving mail pouches that are sent to/from Santiago daily and to/from the U.S. weekly. This service includes collecting the correspondence, preparing the pouch and routing the received correspondence for delivery to the addressees.
- While some Clients and departments have reception staff and facilities to serve their own specific needs, the service described in this Agreement serves as the main reception for all the observatory departments and programs on the LS Recinto. This provides:
 - A common, responsive interface to the public and to visitors unfamiliar with the division of the AURA organizations,
 - Efficient management of shared mail and telephone reception services.

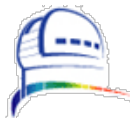
12.2. Scope of Service

- **Front Desk Service:**
 - The reception lobby for NOAO-S is frequently the first point of contact for outside visitors to the AURA organization in Chile. A principal objective of the service is to orient and properly direct visitors to the appropriate departments or staff of the Service Provider and Clients. To carry out this duty receptionists employ public relations skills – including Spanish and English fluency – to effectively communicate with the clientele and visitors to the organization.
 - Front-desk receptionists answer questions about the general nature of the organization, notify staff of Clients or the Service Provider with whom the visitors wish to meet, take and deliver messages to/from visitors or staff, arrange transportation for visitors or staff, and perform other reception-related services.
- **Telephone and E-mail Reception:**
 - NOAO-S receptionists also have the duty of receiving telephone calls and emails of a general public nature and those for which the caller/sender does not have direct contact information for the person, department or program they wish to reach. Calls and emails are responded to appropriately either with the requested information or by redirecting the caller/sender to the appropriate person or department to satisfy their inquiry.



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- Main extensions within the telephone plant to which the receptionists have access to transfer calls are:
 - La Serena NOAO-S, AURA, offices and compound houses (2205-200 & 300)
 - Cerro Tololo NOAO-S facilities (2205-400)
 - Cerro Pachón NOAO-S & SOAR facilities (2205-500)
 - La Serena Gemini facilities (2205-600)
 - Cerro Pachón Gemini facilities (2205-700)
- Some of the public contacts are requests to visit the observatory sites. The response to these requests is also carried out by the receptionists as a separate Visitor Center service (see Section 13)
- The receptionists receive and distribute phone calls during office hours from 08:30 am to 18:00 Monday through Friday. During non-office hours and on weekends the reception phone line is transferred to the LS Recinto gate house. The guard at the gate house answers phone calls – advising callers of general information and working hours of the business – but does not perform the full informational and call-routing service performed by the receptionist. (see Section 5, Security Service)
- **Postal-Service and Hand-Delivered Mail:**
 - The public postal-service mail is picked up from the Post Office in downtown La Serena at midday Monday through Friday, subject to availability of a driver. The driver for this service is provided by the garage service (see Section 11). The receptionists receive all of this postal-service mail – addressed to the AURA P.O. box 603, as well as any mail that is hand delivered by the sender or a courier. All of the mail is sorted by the receptionist and distributed to the appropriate boxes in the mail room beside the reception lobby. All Client programs, NOAO-S departments and LS Recinto residents have assigned mailboxes in the mail room.
 - There is also a receptacle for mail addressed to Client and Service Provider personnel who work at CT or CP. The receptionist collects this mail and sends it daily via the shuttle (see Transportation Service, Section 10) to the appropriate administrative assistants of on CT and CP for distribution to the recipients.
 - Outgoing public postal-service mail is collected in a separate receptacle and sent daily by the receptionist to the La Serena post office via the garage-service driver who makes the daily pickup.
- **Official Mail Pouches:**
 - Mail pouches, authorized for official mail of the AURA organization, are contracted to an exterior courier company and managed by the staff of the reception service. Mail intended to be delivered via mail pouch is deposited by the users in marked receptacles in the mail room.
 - A daily mail pouch is prepared and sent from the La Serena reception to the office of AURA in Santiago. Each weekday the receptionist collects all Santiago-bound mail and records each parcel on a list form – copies of which accompany the pouch and are maintained on file. The reception also receives a daily mail pouch similarly prepared and sent from the Santiago office. The Santiago pouch is picked up and dropped off at the reception lobby at 16:30 Monday through Friday by a driver of the courier company.
 - A weekly mail pouch is prepared and sent from the La Serena reception to the NOAO-North offices in Tucson. Once a week the receptionist collects all U.S.-bound mail and



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completes the required accompanying paperwork according to international diplomatic regulations. Similarly an international diplomatic pouch is prepared at the Tucson offices and sent weekly to the La Serena reception. The U.S. mail pouch is picked up and dropped off at the reception lobby on Thursdays at 16:30 by a driver of the courier company.

- The Reception staff manages the proper functioning and coordination of the mail pouch services, including timely notification to users regarding any variance in delivery/pickup days and times.
 - Reception, sorting and routing of the correspondence received in the Santiago and U.S. mail pouches is carried out in the same manner as described above for the postal-service mail.
- **Other Duties**
 - Assist in the sales of souvenir items. Sales transactions are handled directly by the AURA Employees Association (*Bienestar*).
 - Dispense and receive LS hotel room keys to visitors with hotel reservations.
 - Assist in the coordination and dispensing of information to visitors regarding shuttle transportation. (see Section 10)
 - Assist visitors using the work stations in the library, and general control of the library when the librarian is not present.
 - **Additional Services**
 - Performance of any reception duties beyond normal business hours (08:30 to 18:00) or beyond the scope described above.

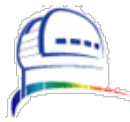
12.3. Dedicated Resources

Labor

- The Service Provider maintains 1.5 FTE (two part-time staff members) dedicated to the Reception service. Each of the two receptionists also have other assigned duties, mainly for the Visitor Center (see Section 13). The receptionists are administrative professionals with fluency in Spanish and English.
- The Service Provider, through the reception service dedicates approximately 2 hours per day to pick up and drop off mail daily at the post office.
- Approximately 0.1 FTE (1/2 day per week) of an administrative assistant in the AURA Santiago office is dedicated to receive and process NOAO-S mail pouch.
- Approximately 0.1 FTE is jointly provided by the security service and the CTIO librarian to cover some reception duties when the receptionist is not present.

Materials and Equipment

- The facilities and materials required for reception activities are supplied by the Service Provider as an integral part of the service. This includes:
 - Reception lobby – located at the NOAO-South headquarters building in the LS Recinto – outfitted and maintained by the Service Provider as appropriate for primary interface to the public and observatory visitors. Furnishing of the reception lobby includes:
 - A reception desk with a computer station, telephone with call routing capability, and other requirements for the reception tasks.



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- Comfortable visitor seating and a side table,
- Video monitors, posters and other display items depicting observatory activities of interest
- A glass case for display of souvenir items offered for sale
- Finishes, lighting and decor appropriate for the primary reception area of a public/governmental office facility
- Utilities (electricity, HVAC, telephone/data connection)
- Mail room – located adjacent to the reception lobby – with outgoing distribution boxes for all Client programs, NOAO-S departments, LS Recinto residents, and for the incoming collection of postal service and mail pouch correspondence.

12.4. Service Requests

- The normal activities of the Reception area consist of a continuous, repetitive and well-defined scope of work. There is therefore normally no need for specific request by the Client to assure performance of this service.
- Requests for special assistance that are within the scope of services described above are received by telephone, email or in-person by the receptionists during their normal work hours as defined below.
- The reception services are conducted under the supervision of the NOAO-South Administrative Management. Concerns of the Clients regarding the quality of the work are directed to the Administrative Manager for attention.
- Requests for Additional Work by the Client must be requested to the Administrative Manager, and are subject to the provisions defined in the General Conditions (section G-3)

12.5. Hours of Coverage and Response Times

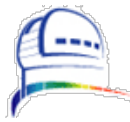
- The normal hours of work for the receptionist in the reception lobby are 08:30 pm to 18:00 Monday through Friday.
- Requests or consultations regarding general management of the reception service are received by CTIO Administrative Manager during normal business hours, 08:30 am to 17:30 Monday through Friday. The initial response to such requests is within 1 to 5 working days.

12.6. Reporting

- The Service Provider maintains records of the mail pouch correspondence to/from the U.S. and Santiago.
- AURA-CAS maintains cost accounting information regarding the reception services.

12.7. Performance Metrics

- There are no formal performance metrics for the reception service.
- Records are maintained by the Service Provider of all complaints and comments received from Clients and visitors regarding the reception service. Information regarding that feedback and any actions taken is available by appropriate request to the Administrative Manager.



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13. Visitor Center

Basic Purposes:

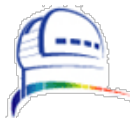
- To inform the general public about the activities performed and the instrumentation used at the AURA Observatory in Chile, a first-class scientific facility dedicated to astronomical research, with worldwide recognition.
- To provide information about astronomy and scientific research, raising public awareness on the importance of a dark night sky.
- Encourage people from different nationalities, ages and educational levels to enjoy learning about astronomy and to become involved in preserving the dark skies of northern Chile.

13.1. Definition of Visitor Center

- The Visitor Center of the AURA Observatory in Chile is a tool to promote astronomy and to reach out to the general public. The Visitor Center receives visitors of varying background, including students, authorities, tourists, senior citizens (mostly from cruise ships), national and international.
- The Visitor Center has been in operation since the late 60s, and over the years has received more than 150,000 people.
- The Visitor Center offers free tours that in addition to a bilingual tour of the AURA facilities, include a series of activities supporting this tour. The audience is as large as possible, within the restrictions of the physical site and facilities visited. .
- Tours are held every Saturday in two shifts, 9:00 am and 1:00 pm.
- Transport to the Observatory is not included in the tour; visitors must provide their own transportation to and from the designated arrival point at the main telescope area on CT.
- The following are the activities covered by the Visitor Center:
 - NOAO-S Reception is responsible for reservations and guidance: take reservations, deliver authorizations and advise to the visitors about traffic, tour schedule and safety rules.
 - Guards at the CT/CP Control Gate control visitor access: check visitors authorizations, vehicles and give instructions for safe driving and road conditions, including the location of emergency communication radio stations.
 - Visitor Center Guides provide the tour of the facilities at Cerro Tololo
 - The guides also present Astronomy topics, Observatory milestones, and dark skies protection.

13.2. Scope of Service

- **Reservation and Guidance:**
 - NOAO-South Receptionists receive telephone, e-mail and personal requests for visits to the Observatory. They book visitors according to an acceptable maximum number of 50 people for each one of the two tours on Saturday. Weather and observatory road conditions are taken into account when handling the reservations.
 - Once reservations are confirmed, visitors must pick up the permission form at the NOAO-S Reception, where Receptionists also provide driving directions to the facility, tour schedule and remind visitors of road safety and rules.



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- The permission form to access the Observatory contains a visitor responsibility clause and has to be signed by the visitor. A signed copy is left at Reception, and take the original authorization with them together with a copy to be delivered on the Control Gate on the day of their visit.
- **Visitor Access Control:**
 - On the Saturday of the tour, visitors are required to be at the Control Gate 30 minutes before the start of the selected tour, i.e. at 8:30 am for the morning tour and at 12:30 pm for the afternoon tour.
 - The Guards at the Control Gate request and check each visitor's authorization and retain the second copy for their files. They reiterate instructions for safe driving and road conditions, including any current special conditions or hazards to be aware of.
 - The visitors are given directions to reach the CT summit, and the group proceeds in their own vehicles in the form of a caravan.
- **Facility Tour and Lecture:**
 - Visitors are greeted by NOAO-South Tour Guides, in the parking area of the main telescope platform on CT, and the activities of the visit start:

10:20 or 2:20 Arrival of visitors to the Cerro Tololo Summit

10:45 or 2:45 Visit 1.5-m telescope (~ 20 minutes)

- Introduction and description of the Cerro Tololo Observatory
- Description of 1.5-m telescope
- Ascension & declination movement of telescope (if possible)
- Rotate dome
- Questions and Answers

11:15 or 3:15 Visit 4-m Victor Blanco Telescope (~ 20 minutes)

- 4-m Victor Blanco Telescope characteristics and history
- Main research performed at the 4-m Telescope
- Milestones of the 4-m Telescope
- Questions and Answers

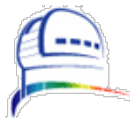
11:40 or 3:40 Presentation in the Visitor Center Lecture Hall:

The guides lead the visitors to the lecture hall located on the first floor of the 4-m Blanco Telescope and provide information on the following topics:

- Dark skies protection
- General astronomy
- Night sky images from observations at AURA Observatory in Chile
- Presentation of astronomically themed films (e.g. Distant Worlds by Prof. Carlos Ibañez ; Cosmic Voyage Imax Series; or Journey To the Stars from the AMNH (~ 20 minutes)

12:30 or 4:30 End of Tour

Visitors are reminded of driving safety information and begin the trip down from CT.



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Additional Services

- The Observatory receives regularly requests for special tours from for example cruise ships (mainly of U.S.-based companies), university alumni and other groups, especially during the summer tourist season.
- These tours are accommodated for as much as possible, providing support staff is available and the requested days is not a Saturday.
- In these special cases, the Observatory charges the travel agency a fee, to cover the cost associated with the tour. This fee is calculated by the AURA Accounting department (CAS) and covers the estimated cost of labor hours and resources involving the employees participating in the guidance of these visitors.
- The income from these fees is received directly into the account dedicated to the Visitor Center Program.

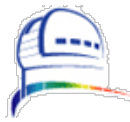
13.3. Dedicated Resources

Labor

- The Service Provider maintains two 0.25 FTE (Full-Time Equivalent) of Visitor Center Guides, dedicated to carrying out the Visitor Center activities as described above. This currently consists of 2 on-staff members, each of whom also have other assigned duties in the Reception of NOAO-South.
- The specific days and the amount of hours dedicated to reservation activities vary, depending on the time of the year. The demand is higher during the summer tourist season and vacation periods, with up to 3 hours spent per week on the reservation process.
- The Guides are bilingual (Spanish and English) and are familiar with the astronomical and technical material that is presented on the tour.
- The Guards at the Control Gate perform an important role in the authorization and safe passage of the visitors on the observatory roads. The FTEs of the Guards are covered under the Security Service described in this Agreement and are not directly charged to the Visitor Center service.
- The Nurses at CT are an important resource in making this service feasible and in mitigating the potential risks to visitors that are inherent in the access and altitude of the site. The FTEs of the Nurses are covered under the Emergency Medical Service described in this Agreement and are not directly charged to the Visitor Center service.

Materials and Small Equipment

- The facilities and materials required for Visitor Center activities are supplied by the Service Provider as an integral part of the service. This includes:
 - Visitor Center lecture hall, located at the Blanco 4-m Telescope, is outfitted and maintained by the Service Provider for comfortable accommodation of the maximum number of visitors per tour. Outfitting of the lecture hall includes:
 - Up-to-date informative graphics and aids on astronomy in general, research activities of the AURA Observatory and the importance of dark skies for that research
 - Overhead projector and screen for presentations
 - Demonstration telescopes and instruments



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- Celestial and planetary globes, models and maps
- Presentation tables and 50 chairs for visitors
- Maintenance of appropriate finishes and lighting as required.
- Informational signage to direct visitors to the telescope location on CT
- Personal protection equipment for the Guides
- Utilities (electricity, HVAC, telephone/data connection)

13.4. Service Requests

- The normal activities of the Visitor Center consist of a continuous, repetitive and well-defined scope of work. The primary service requests are the tour reservations, as defined above. There is therefore normally no need for specific request by the Client to assure performance of this service.
- These services are conducted under the supervision of the NOAO-S EPO department. Concerns of the Clients regarding the quality of the work are directed to the Administrative Manager for attention.
- Requests for Additional Work by the Client must be requested to the Administrative Manager, and are subject to the provisions defined in the General Conditions (section G-3)

13.5. Hours of Coverage

- The Visitor Center service hours are between 8:30 to 16:30 on Saturdays.
- Reservations can be made during office hours, 08:30 – 17:30 on week-days. .

13.6. Reporting

- The Service Provider provides monthly written reports about Visitor Center activities. Information includes number of visitors, age range and gender.
- The Nurses at CT submit a written weekend report, which includes a description of: the time of arrival and departure of the Guides and the tour groups, the number of visitors in each group and any special assistance or attention that the Visitor Center activities required.
- The cost for Visitor Center services is tracked separately by the Administrative Manager.
- Accounting information regarding the common Share Fees which pay for the general Visitor Center activities as well as the fees paid for special tour accommodations is maintained by AURA Central Administrative Services.

13.7. Performance Metrics

- A record is kept by the Service Provider of the following statistics as a measure of Visitor Center performance:
 - The total number of visitors per tour group and per month.
 - Statistics on demographics distribution of visitors, including age range, nationality and gender
 - Information on the nature and scope of special visits that are accommodated for which fees were charged.
 - Visitor registry with comments or other form of feedback.