50 Years of Facility Operations

or

"Rebuilding from the inside out"

National Optical Astronomy Observatory (NOAO) NORTH

Kitt Peak National Observatory

and

Tucson Headquarters Facility

Presented by

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National Optical Astronomy Observatory

NOAO is managed and operated by the Association of Universities for Research in Astronomy (AURA) through a joint NSF Cooperative Agreement. It is a Multi-Institutional organization with a mission of providing access to state of the art facilities.

AURA Mission

"To promote excellence in astronomical research by providing access to state-of-the-art facilities".

NOAO Mission

Promote excellence in astronomical research by providing the interface to state-of-the-art facilities and data for US ground-based astronomy, and thus to fulfill the role of the National Observatory.

Overview

- NOAO North Facilities –
  - Kitt Peak National Observatory
  - Tucson Headquarters Facility
- Highlight Operational Challenges
- A Look at the Future

Elevation ~7,000 feet

Located ~ 55 miles southwest of Tucson.

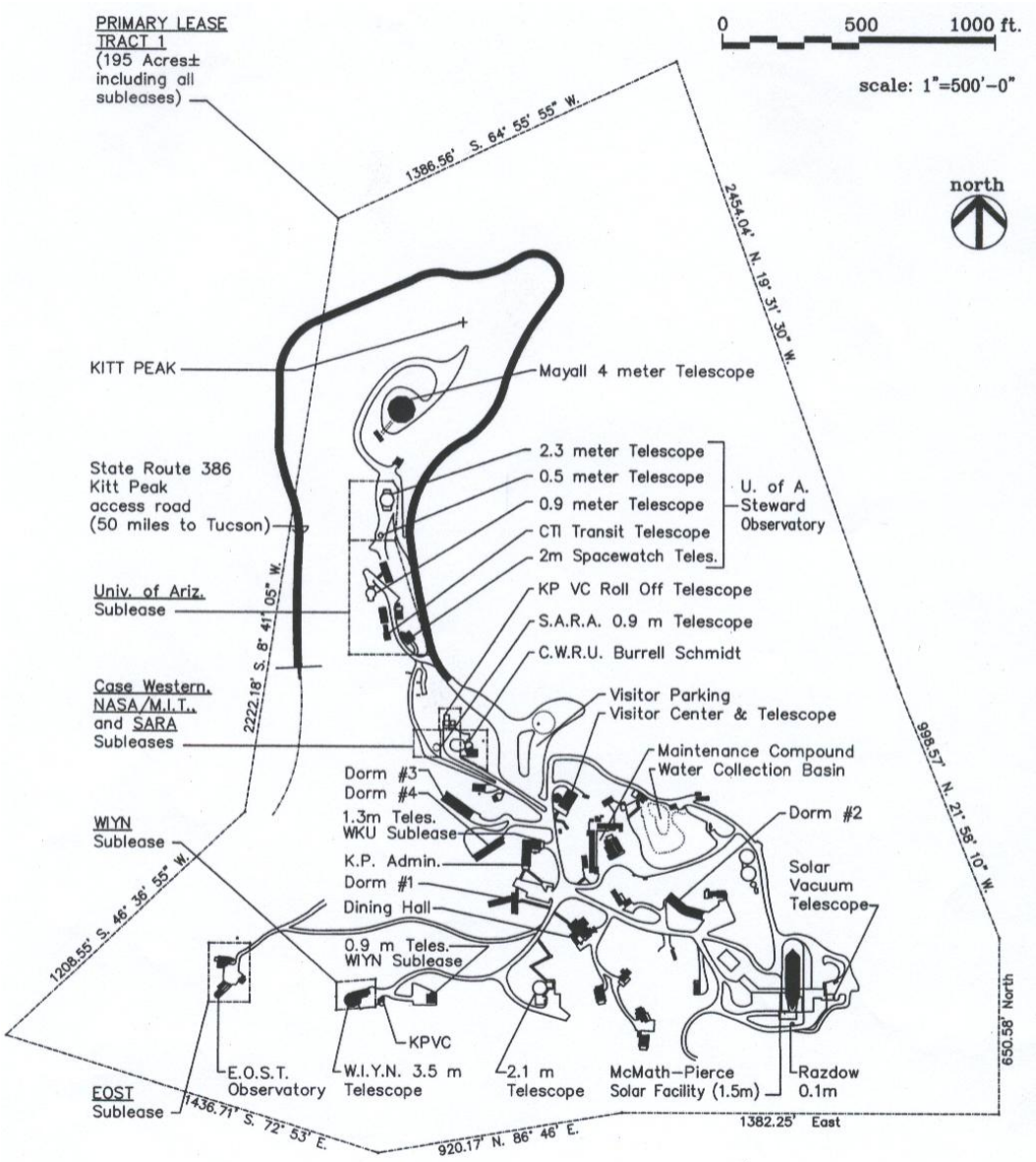
On NSF leased land within the boundaries of the Tohono O'odham Nation.

The facilities sit on ~ 300 acres of the total 2400 acres leased.

NOAO operates and maintains the site for the NSF and it's tenant organizations.

NOAO-North
Kitt Peak National Observatory

- Mountain top site supporting a diverse collection of astronomical observatories.
- Founded in 1958, by AURA and NSF.
- KPNO operates three major nighttime telescopes, Mayall 4-Meter (1972), the 3.5-Meter WIYN (1993) , the 2.1-Meter (1960).
- NSO operates three solar telescopes, McMath-Pierce (1962), FTS (1976), and SOLIS (1974/2004).
- Kitt Peak also hosts the facilities of 9+ organizations operating over 14 telescopes.
- A Visitor Center and Museum is open to the public each day with an estimated 60,000 annual visitors. A nightly observing program is also offered.



Major Telescopes

187 ft high Mayall Telescope built in 1973. Note 22 air circulation vents to improve seeing were installed in 1997.

3.5-Meter WIYN Telescope, built in 1993

2.1Meter telescope & Coudé Feed built in the early 1960s.

Mountain Operations - Kitt Peak

Operate like a small village with all major utility systems provided, maintained and supported by NOAO.

Utility Systems

- Water –
- Electrical –
- Roadways –
- Phone/Data –
- Lodging/Food Services –
- Fuel Services –
- Heavy Equipment -

Kitt Peak Telescope Operations

Telescope Upgrades

- New instrumentation – IRMOS, NewFirm, ODI
- Heat extraction systems, mirror cooling –
- Instrument cooling systems –
- Data Bandwidth –
- Impact on building infrastructure –
- Impact on mountain infrastructure –

Mountain Operational Challenges

- Base mountain infrastructure now 50 years old.
- Evolving building usage.
- Increased telescope enclosure maintenance.
- Impact from new instruments.
- Instrument operational and support demands
- Building environment controls for telescopes & instruments.
- Electrical distribution systems.
- Changing environmental regulations
- Site constraints.
- Emergency response Issues.
- Public Impact on site
- Water availability
- Backup generator power
- ??

Proposed Rebuilding Projects

- Update the primary water treatment plant.
- Replace large 4M Chiller
- Revisions to the Tucson/KP Data link
- Construction of Instrument Handling Facility
- Replace or Update/renovate lodging facilities
- Update/renovate dining facility
- Replace/upgrade UG Water and Electrical lines
- Revising roof systems, peak?, metal?
- Upgrading buildings to improve energy efficiency. Windows, Heating,
- Update/renovate 4Meter elevators

NOAO-North
Tucson Headquarters Facility

NOAO – North

Facility Operations (50 years of expansion)

Main Facility - 11 unique additions built during an initial span of 11 years

A	–	JANUARY	1959
B	–	MARCH	1960
C	–	MARCH	1962
D	–	OCTOBER	1963
E	–	DECEMBER	1963
F	–	SEPTEMBER	1964
G	–	FEBRUARY	1966
H	–	NOVEMBER	1966
J	–	NOVEMBER	1967
K	–	MARCH	1970
L	–	DECEMBER	2001

Tucson Headquarters

Building Space accommodates the following occupants and uses

NOAO Divisions

- Director's office and staff
- Science Support - North staff
- Administration and Infrastructure
  - Central Administration Services
  - Central Facilities Operations
- Education and Public Outreach
- Computer Infrastructure Services
- Systems Division
  - Giant Segmented Mirror Telescope Program Office
  - System Instrumentation Program
  - Science Data Management Program
  - System Development
- Kitt Peak National Observatory
  - Engineering Staff
  - Scientific Staff
- NOAO Gemini Science Center
- NOAO Large Synoptic Survey Telescope Program
- WIYN Observatory

National Solar Observatory Tucson (NSO-T)

- Director's office and staff
- Science Support - North staff
- NSO – Kitt Peak
- GONG program
- ATST program

Tucson Headquarters Facility

Support staff space for NOAO, NSO and various affiliated groups.

Building Occupancy Usage and Staffing Levels have also changed over the years:

- Staffing; 1969 ~ 251 FTE, 1990 ~247 FTE, 2007 ~ 305 FTE
- Space Utilization:

	Offices	Labs/Shops	Circulation/Conference/Common
1990	32%	39%	29%
2008	35%	28%	37%

Facility

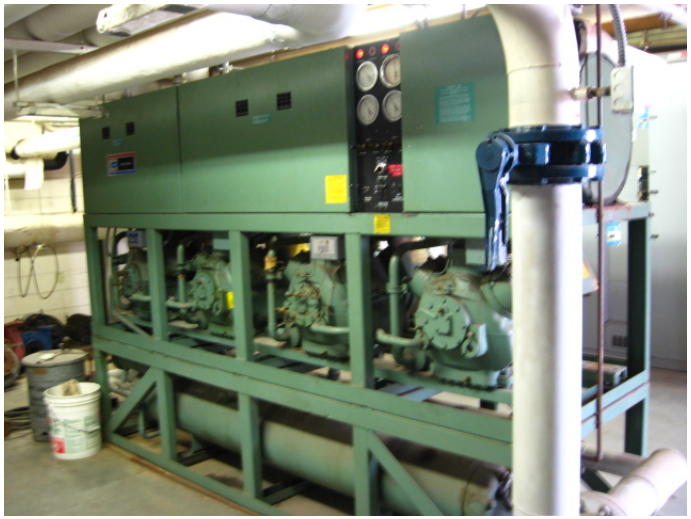
- Approximately 131,000 sf within 8 Structures.
- Main building has 10 different floor levels, 17 Rest-Rooms
- Construction materials – Masonry, concrete, modular trailer, adobe

Usage

- Major transition from lab/shop space to office space
- Warehouse and building shop space accommodate various needs
- Retain optical and basic machine shops as well as a small coatings facility.
- Remodeling has added basic instrumentation clean rooms and test facilities

Rebuilding HVAC systems

Mechanical and HVAC systems
Air handling systems are wearing out
Replacing internal blower units, Rebuilding dampers,
Starting program to replace coils
Changes in building usage impact system operation
Old inefficient chillers are being planned to meet new needs.



Past Facility Renovations

Shops and labs converted to Office space.

Main building construction
Internal masonry walls
Low ceilings
Lots of corridors
Redundancy of usage.

Changing usage

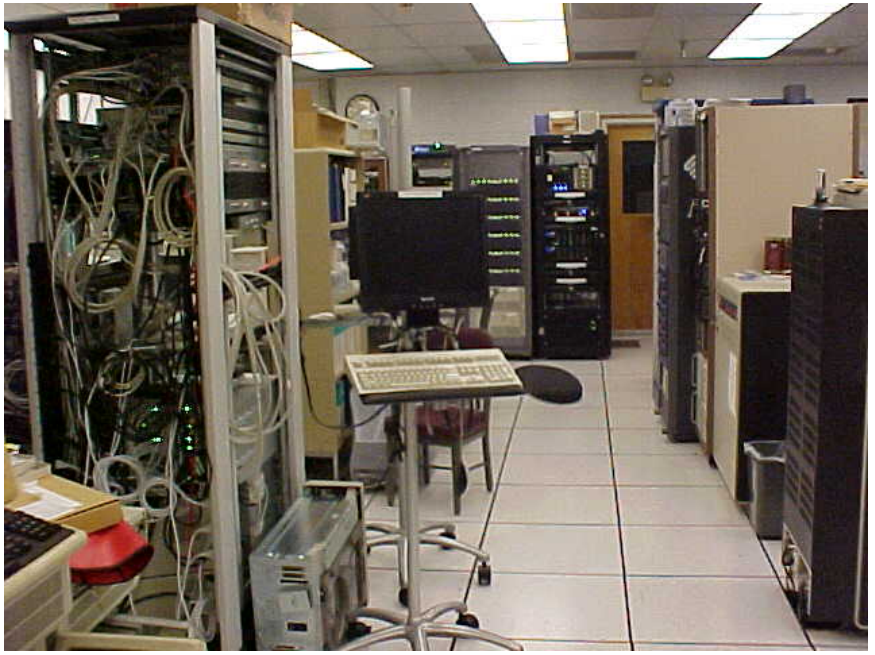
Patios being converted to Xeriscape landscaping.

Original switchgear

Electrical system
Both 480V delta and wye systems

New gear

Tucson Computer Lab



Critical resource for all NOAO operations. Increasing demands for computing capacity and data storage.

Operates 24 hours a day every day.
No backup cooling systems.

NOAO – North Facilities Challenges

- An evolving NOAO
- Support to new observing systems
- Increased focus on computer and new technologies
- Challenges to adapt existing support systems
- Age of structure and renovation needs
- Building support infrastructure
- Re-engineering space usage
- Greening of facility
- Improving the work environment.
- Staffing changes or retirements
- New skill sets

Proposed Rebuilding Projects

- Replace building alarm detection systems.
- Replace 30 year old chillers and piping systems
- Replace and update building electrical systems
- Renovate air handlers and duct systems

- Implement water conserving projects
- Renovate building interior spaces
- Renovate restrooms and replace fixtures
- Replace/upgrade building management system
- Revise or redevelop interior space for new uses
- Develop new constructions options for office space
- Upgrade/improve energy efficiency.
- Update/renovate 4Meter elevators

Questions?

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