

From: SMTP%"sshears@lodestar.gb.nrao.edu" 18-NOV-1991 15:48
To: backer@bkypsr.berkeley.edu, bania@buast4.bu.edu, demerson@tucvax
Subj: Preliminary Design Considerations

Date: Mon, 18 Nov 91 15:40:05 EST
From: (SUE SHEARS) sshears@lodestar.gb.nrao.edu
Message-Id: <9111182040.AA05136@arcturus>
To: backer@bkypsr.berkeley.edu, bania@buast4.bu.edu,
demerson@tucvax.tuc.nrao.edu, dtw@pupgg.princeton.edu,
gseielst@cvax.cv.nrao.edu, haynes@astro.sun.tn.cornell.edu,
heiles@bkyast.span, hugh@astro.lsa.umich.edu,
jlockman@cvax.cv.nrao.edu, john@astl.spa.umn.edu, loris@naic.edu,
mdavis@naic.edu, moran@cfa.harvard.edu, nzs@radio.caltech.edu.,
pnapier@zia.aoc.nrao.edu, psolomon@sbcmail.bitnet,
riccardo@astrosun.tn.cornell.edu, rmaddale@lodestar.GB.NRAO.EDU,
schloerb@fcrapl.phasts.umass.edu, snyder@prairie.astro.uiuc.edu,
srk@deimos.caltech.edu, sshears@arcturus.GB.NRAO.EDU
Subject: Preliminary Design Considerations

National Radio Astronomy Observatory
Joint Operations Center
Green Bank, West Virginia

PRELIMINARY DESIGN CONSIDERATIONS

Center will have many uses; truly a Joint Operations Center for control and administration of many projects. Goal is to integrate USNO activities in with NSF and other activities in a way that minimizes cost and maximizes efficiency. The various parts of the Center are not divided by project or its funding agency. Nor can people or equipment be precisely separated into projects.

Memorandum of Understanding, NRAO-USNO

Funding Agencies Involved
NSF

Astronomy Division
Education Division

USNO
NASA

Code O--Operations of Satellite Tracking Stations
Code S--Science
Life Sciences

Activities

GBT
Earth-Space Communications Station for OVLBI
Astrometric VLBI Antenna
Alternate Master Clocks
140 ft Telescope (eventually for SETI)

Location of Center

Unified with Jansky Laboratory via an Entrance/Reception/Visitor Center between the new building and the existing one.

Oriented such that telescopes can be seen from Control Room
Therefore, large windowed wall facing approximately West.
Necessitates at least a second story

List of Basic Requirements for Center

General

Compatibility with local environment and with existing buildings

Design to reflect purpose of NRAO: radio astronomy and radio telescopes

Possibility for expansion

Interior walls between offices capable of movement and removal

Views from within able to capture natural beauty of surroundings

Physical Requirements

Energy Efficient (Average Annual Heating Degree Days = 6500)

Air Conditioned

Rest rooms for both sexes on all above-ground floors

Provision for Handicapped

Shower in each sexUs restroom on ground floor

Entrance ramp for Handicapped

Elevator

With indoor and outdoor access from loading dock--roof over dock

Safe for use by people as well as equipment

Standard elevator

Maximum weight capacity 1,000-2,000 lbs.

Door opening approx. >7 ft wide and >6'8" high

Closets for janitorial supplies

Sink

Shelves

Rooms

Control Room for GBT

Equipment Room for GBT, adjacent but separated from Control Room

Common Control Area for USNO, SETI, OVLBI

Adjacent to GBT Control Room

Both easy back and forth travel between rooms, but some barrier offering each the chance to concentrate without disturbance from the other.

Equipment Room for USNO, SETI, OVLBI Operations

Adjacent to GBTUs Equipment Room but with some specifically assigned space for various functions.

Some apparatus is common to >1 project. These need to be co-located.

Area for Computing Facilities for all activities (NSF, USNO, NASA)

In very close contact to Control Room, telescope

operator, and equipment room
Location where astronomer, who is the central focus
the Observatory exists
for, commands telescope, analyzes data, and monitors
functioning of equipment.
Lighting must not glare off computer screens
A common location for peripherals: tape drives,
CD ROM players, printers, plotters, etc.
Carrels (not completely enclosed) for several
workstations

Control Rooms located so that they are easy to get to, but not
on a path between two active centers. (No shortcutting
through Control areas en route between other locations.)
Placing Control Rooms along west wall helps satisfy this
requirement.

Control Rooms, Equipment Rooms, and Computing Area could be on
contiguous computer floor, so that partitions could be moved
freely to readjust space.

Office for Site Director; adjoining office for Secretary

Office for Telescope Operators, just off Control Rooms

Storage Room near Control Rooms, for
Magnetic Tapes
Disks
Computer paper
Supplies
File cabinets
Copy Machine
Facsimile Machine

Approx. 17 offices for resident scientists, programmers, and
engineers. Mix of personnel for all projects, NSF, USNO
(Clocks and Antennas), NASA (SETI and OVLBI), Other

Two offices for telescope users

Two offices for Visiting Scientists (double occupancy)

One office for the Head of Telescope Operations

One office for Telescope Supervisor (Head Operator)

One office for Head of USNO Activities

Area for workbenches, spare parts, tools, and test equipment
(oscilloscopes spectrum analyzers, signal generators, and the
like)

Near Equipment Rooms
Near an Engineer's Office

Indoor Antenna Range and Screen Room
Walls, floor, and ceiling screened against leakage of
microwaves
Interior covered with absorber to kill microwave
reflections
Possibly windowless room (in basement?)

Conference Room

Auditorium/Lecture Hall

Special, isolated room for Atomic Clocks

No through traffic

Secure

Enclosed Environmental Vaults

Utilities Room

Heat/Air Condition

Entry for cables, optical fibers, telephone wires

Electrical junction boxes

Kitchen/Canteen

Sink

Refrigerator

Hotplate

Vending Machines

Special Requirements

Equipment Rooms, Computing Rooms, and Indoor Antenna Test Range screened against microwave leakage (rfi protection)

Especially noisy devices need to be isolated and accorded sound baffling (limit sound level to <50 dbA in all areas)

Control Rooms, Equipment Rooms, Computing Area need computer floor

Forced air, temperature regulated, needs to be circulated through electronics racks with a minimum of noise.

Regulated electrical power for sensitive equipment (clocks, computers, electronics devices, etc.)

Diesel generator for backup power to atomic clocks

Emergency backup lights in all critical areas (in case of power failure)

Fire Detector Alarms throughout building

Fire Extinguishing Devices in Equipment Rooms and Computing Area

Distribution systems for

Telephone

Computer connections to Networks

Hallways and entrances capable of supporting equipment rolled from Jansky Lab and from elevator/loading dock (i.e., "rollabe" floor and entrances wide and high enough).

Estimates of Square Feet Needed for Various Requirements

GBT Control Room

2,500 sq. ft.

GBT Equipment Room

2,000

Common Control Area for USNO, SETI, OVLBI		1,500
Equipment Room for USNO, SETI, and OVLBI devices		1,500
Area for Computing Facilities		2,000
Office for Site Director		330
Office for Secretary		170
Office for Telescope Operators		300
Storage Room		200
Offices for resident professionals		
(single occupancy)	9 x 160 =	1,440
(double occupancy)	8 x 200 =	1,600
Offices for Telescope Users	2 x 300 =	600
Offices for Visiting Scientists	2 x 300 =	600
Office for Head of Telescope Operations		170
Office for Telescope Supervisor		170
Office for Head of USNO Activities		170
Area for Workbenches		380
Indoor Antenna Range and Screen Room		400
Conference Room		400
Auditorium		2,000
Atomic Clock Rooms	?2 x 3,000=	6,000?
Office for Security Guards		120
Utilities Room		300
Kitchen/Canteen		200
TOTAL		25,050 sq. ft.
(excluding enclosed connection to Jansky Lab and basic infrastructure requirements)		
Connections to Various Places around Site		
Optical fibers to (at least)		
GBT		
OVLBI Antenna		
140 ft Telescope		
Astrometric VLBI Antenna		
Tour Center/Shops		
Fiber system for distributing time and frequency references to all antennas from Master Clock Room.		

Audio and Visual cabling of antennas to Operations Center

Computer Connection to Internet

Schedule for Completion

Move into new Control Building should be completed by the end of 1993.