

Giant Magellan Telescope (GMT) Project

Matt Johns, Carnegie Observatories

Pat McCarthy, Carnegie Observatories

GSMT Science Working Group Presentation

Honolulu HI

February 12, 2004

The GMT Partnership

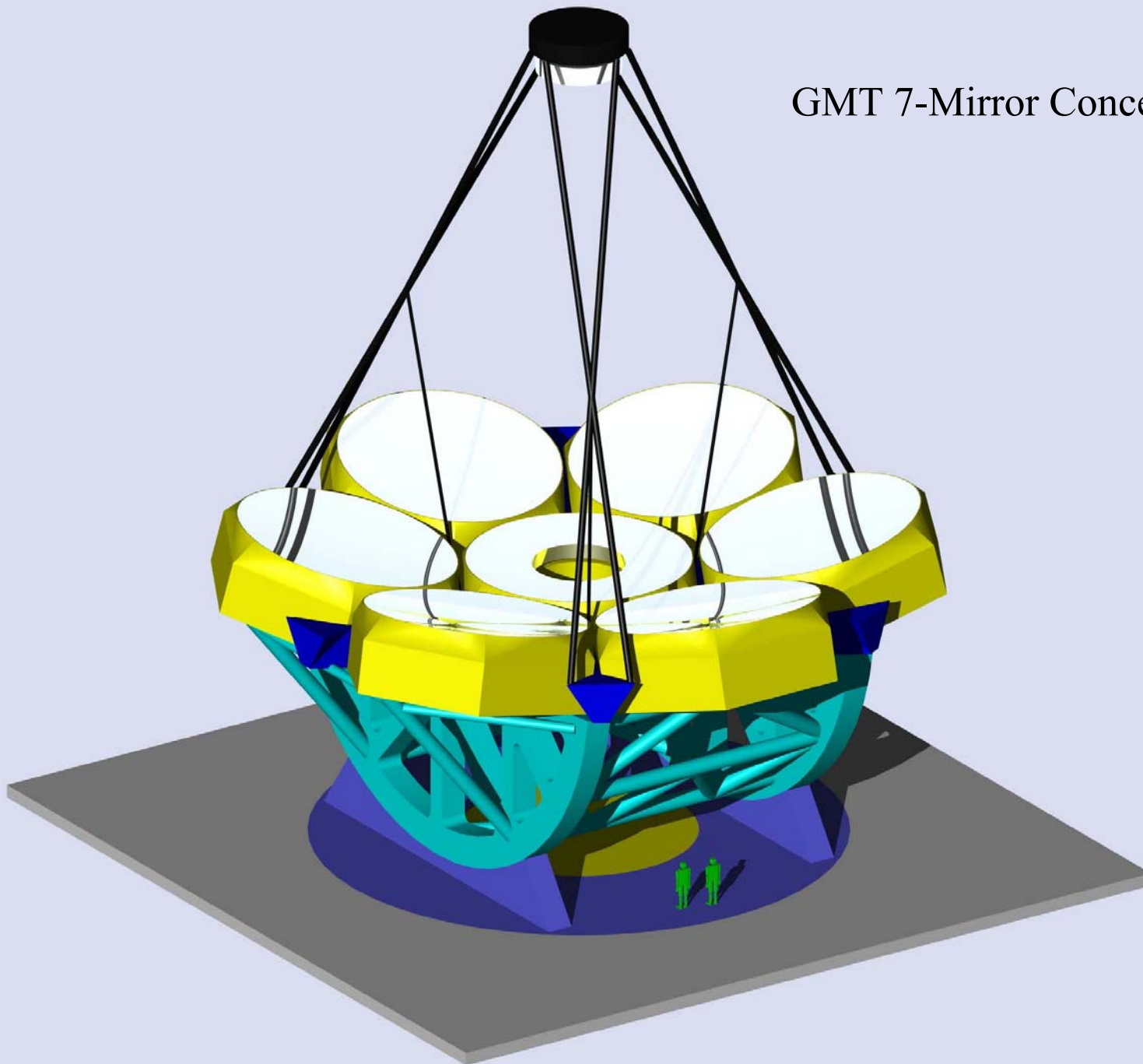


Carnegie Observatories
Harvard University
Smithsonian Astrophysical Observatory
Massachusetts Institute of Technology
University of Arizona
University of Michigan

Governing bodies:

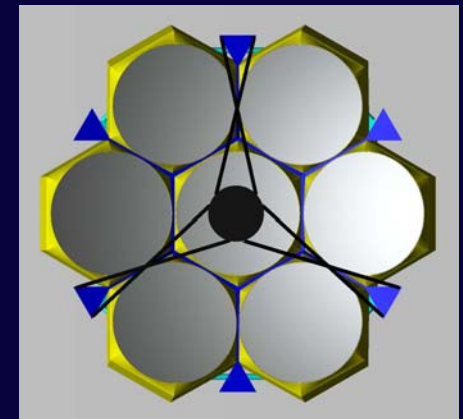
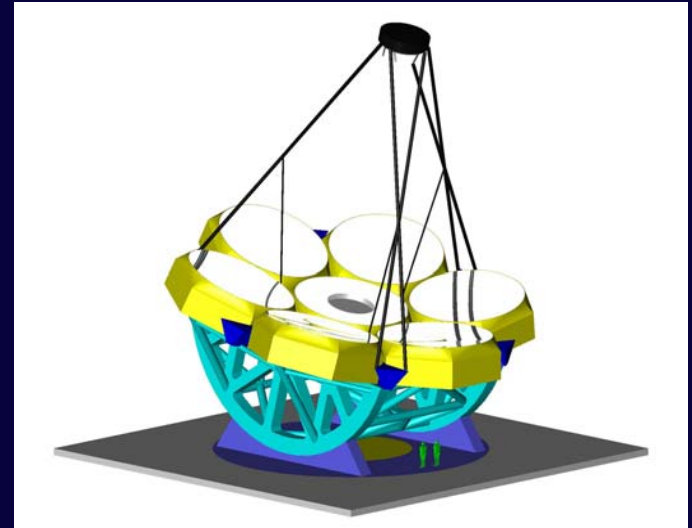
- GMT Board
- Science Working Group
- Project Scientists' Working Group
- Project Office

GMT 7-Mirror Concept

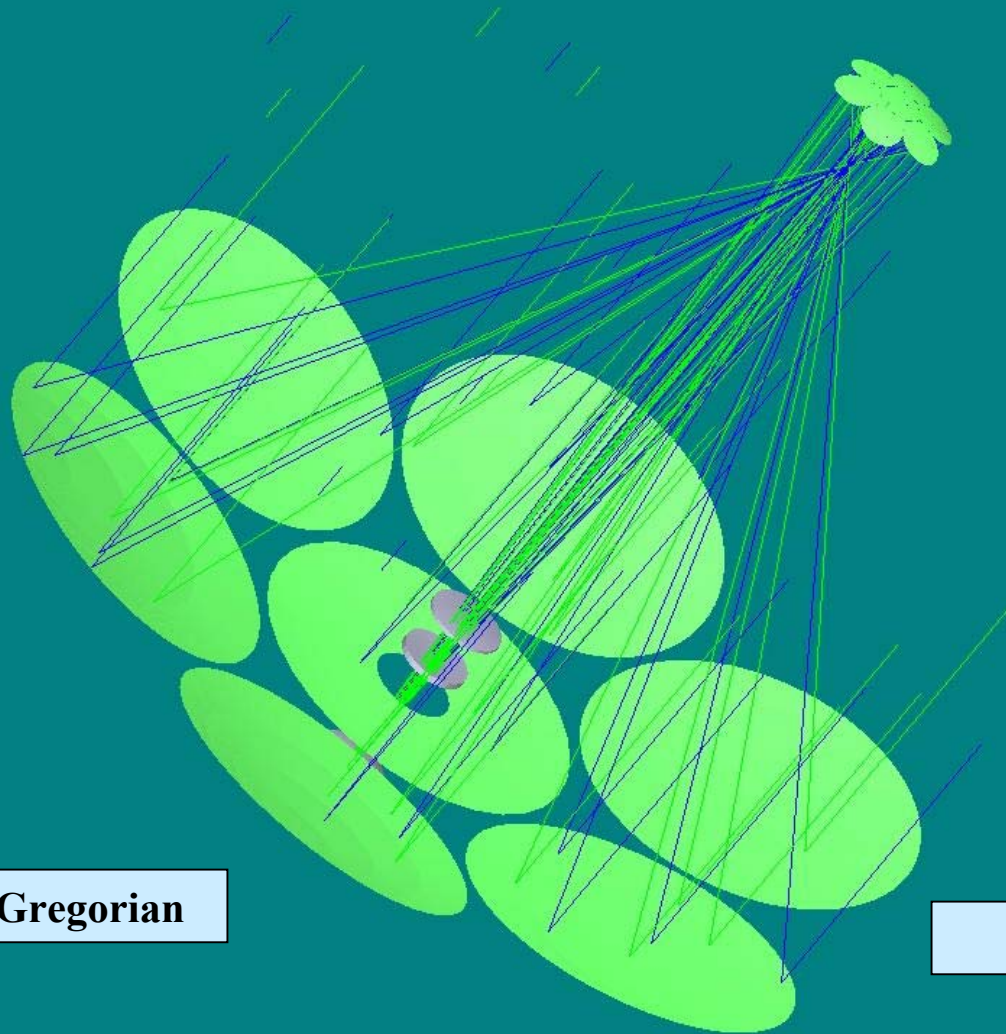


GMT Parameters

- Seven 8.4m meter primary mirrors
 - 25.3 meter enclosed diameter
 - 21.5 meter equiv. aperture
- Optical parameters
 - f/0.7 primary mirror overall
 - 18m primary focal length
 - f/7-9 final focal ratio
- Field of view: 20 - 30 arc-min.
- ~3.2 meter adaptive Gregorian secondary mirror
- Alt-az telescope structure
 - Fully steerable down to ZD = 60° (goal 65 °)
 - Lowest mode 4.0 Hz (goal ≥ 5 Hz)
- Gregorian instrument location.



GMT Optical Layout

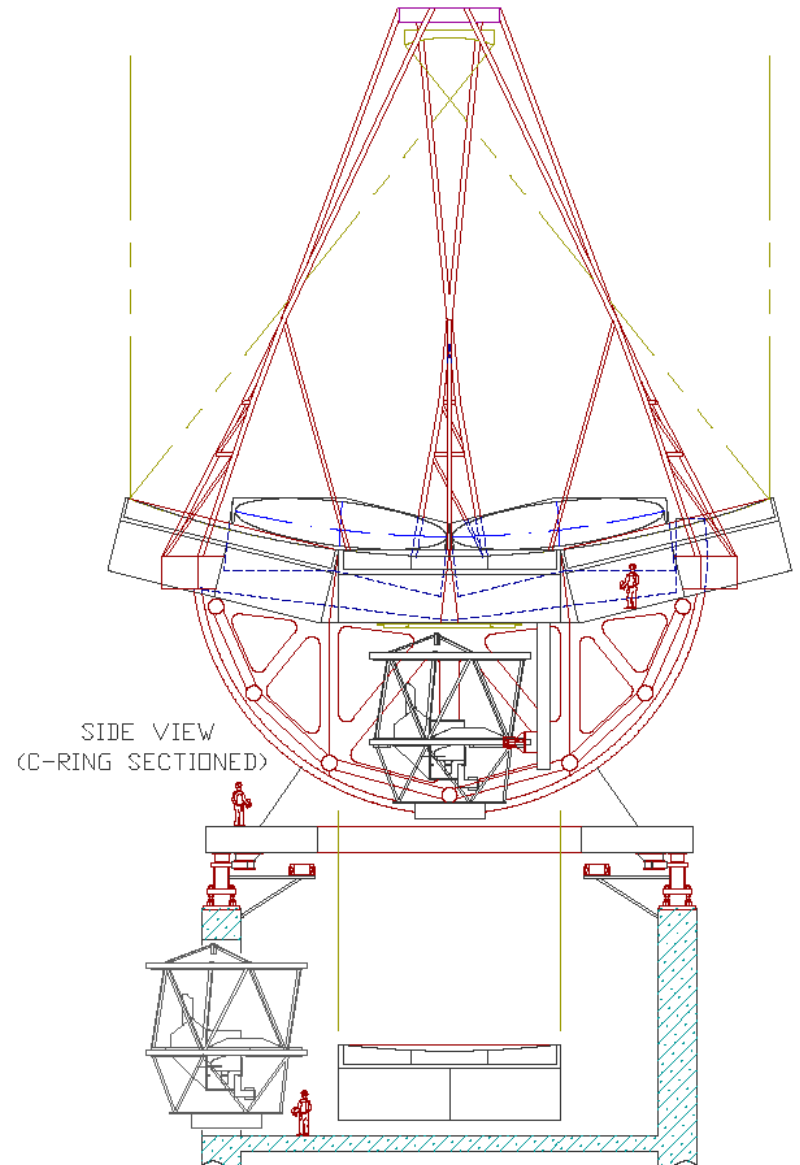
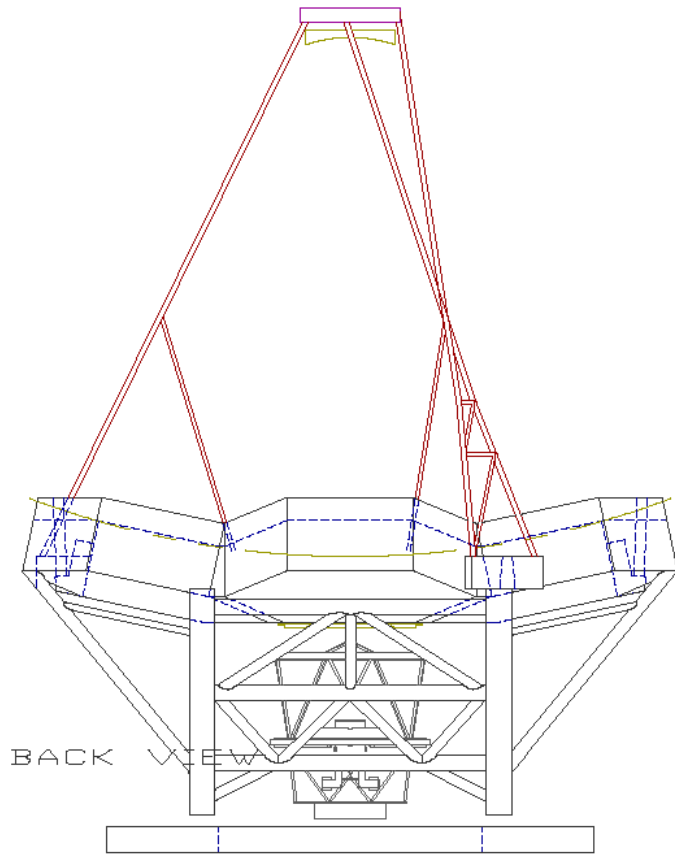


AO Secondary Mirror

Aplanatic Gregorian

M1 = 7 x 8.4 m

GMT Telescope



GMT CONCEPT DESIGN

SMG 8/31/03 - GMT3.DW2

10 M; 393.7 IN.; 32.808 FT

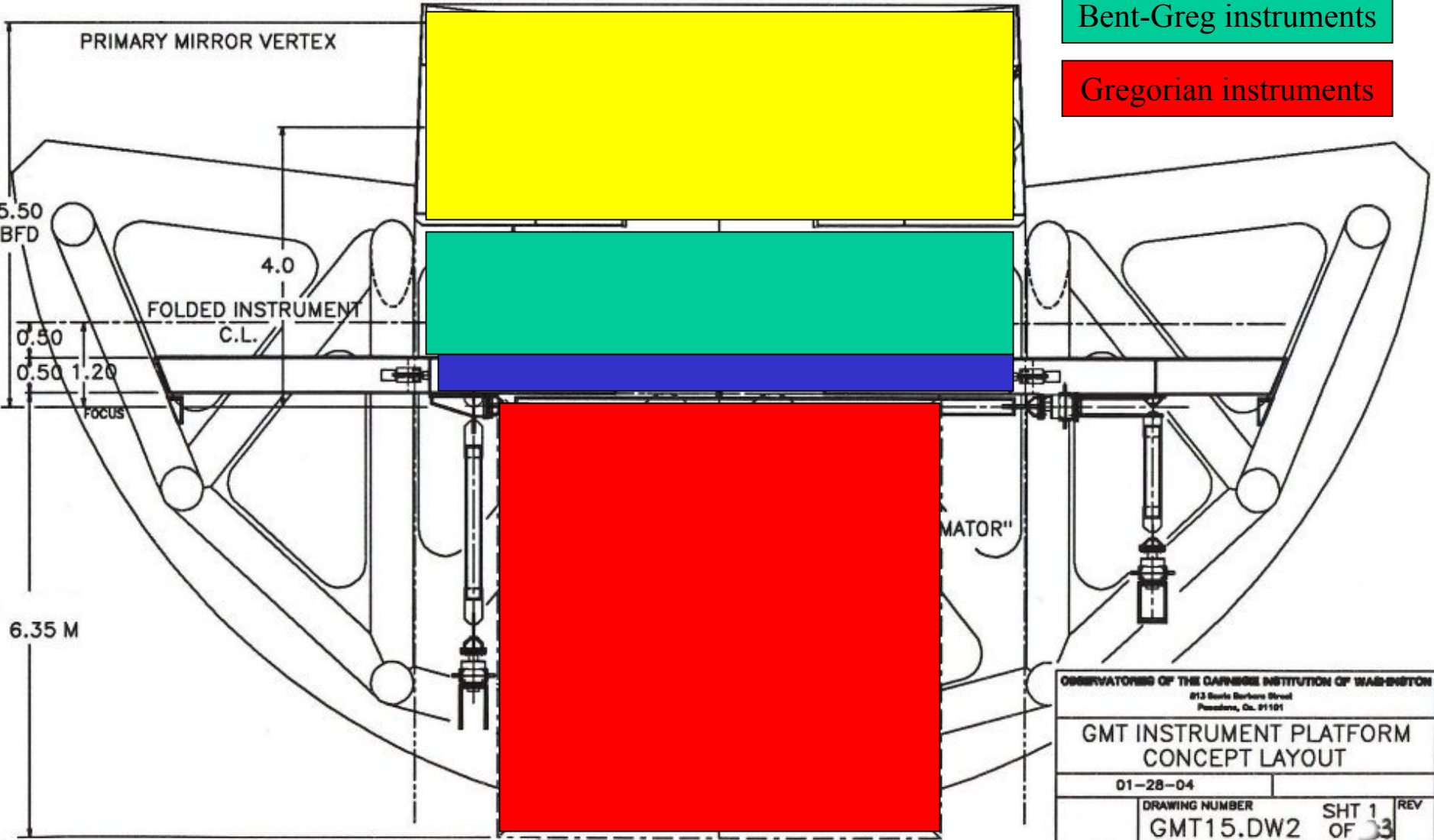
Instrument Platform

Primary mirror & cell

Rotator/guider Assy

Bent-Greg instruments

Gregorian instruments



OBSERVATORIES OF THE CARNEGIE INSTITUTION OF WASHINGTON
 813 South Baltimore Street
 Pasadena, Ca. 91101

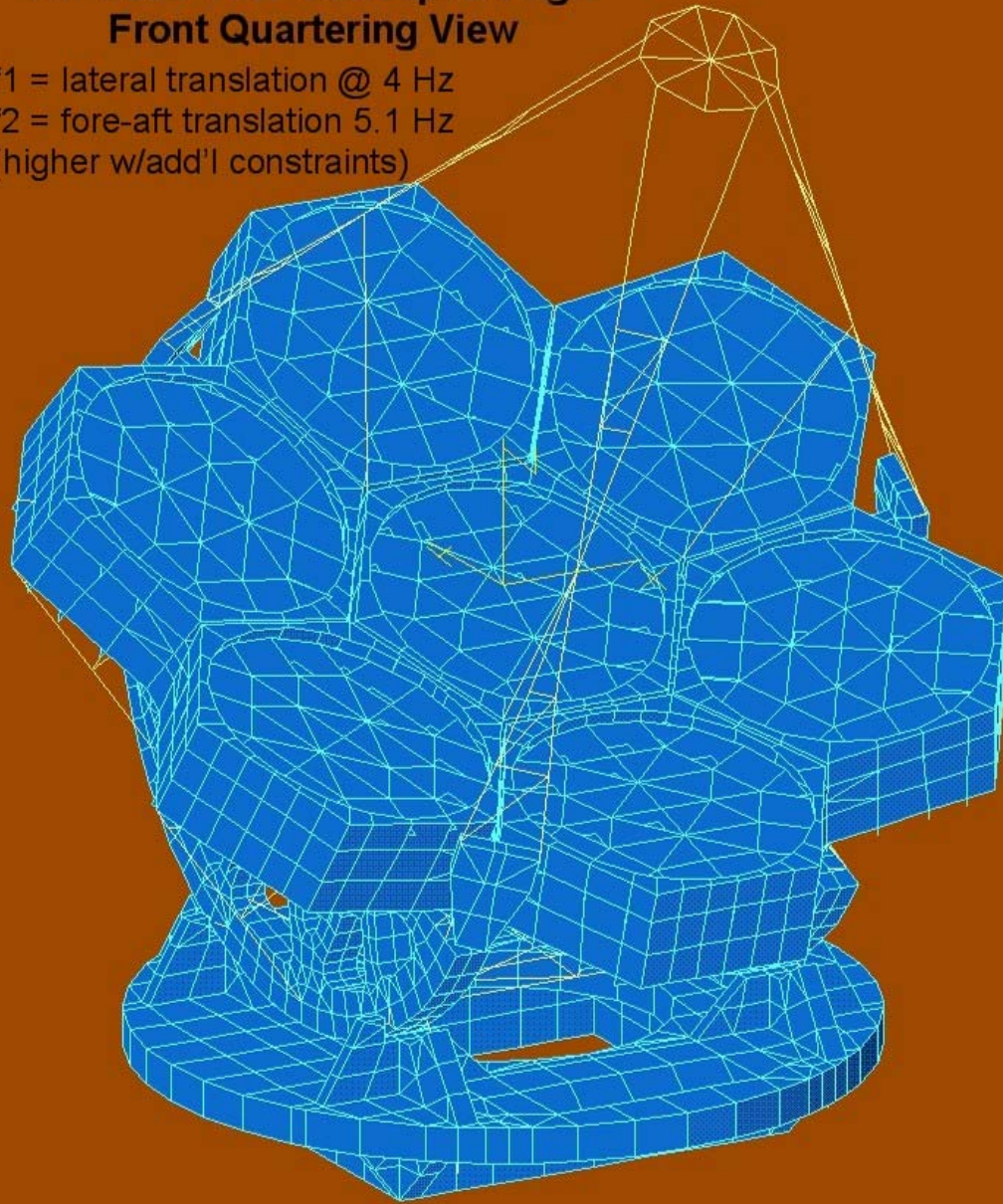
**GMT INSTRUMENT PLATFORM
 CONCEPT LAYOUT**

01-28-04

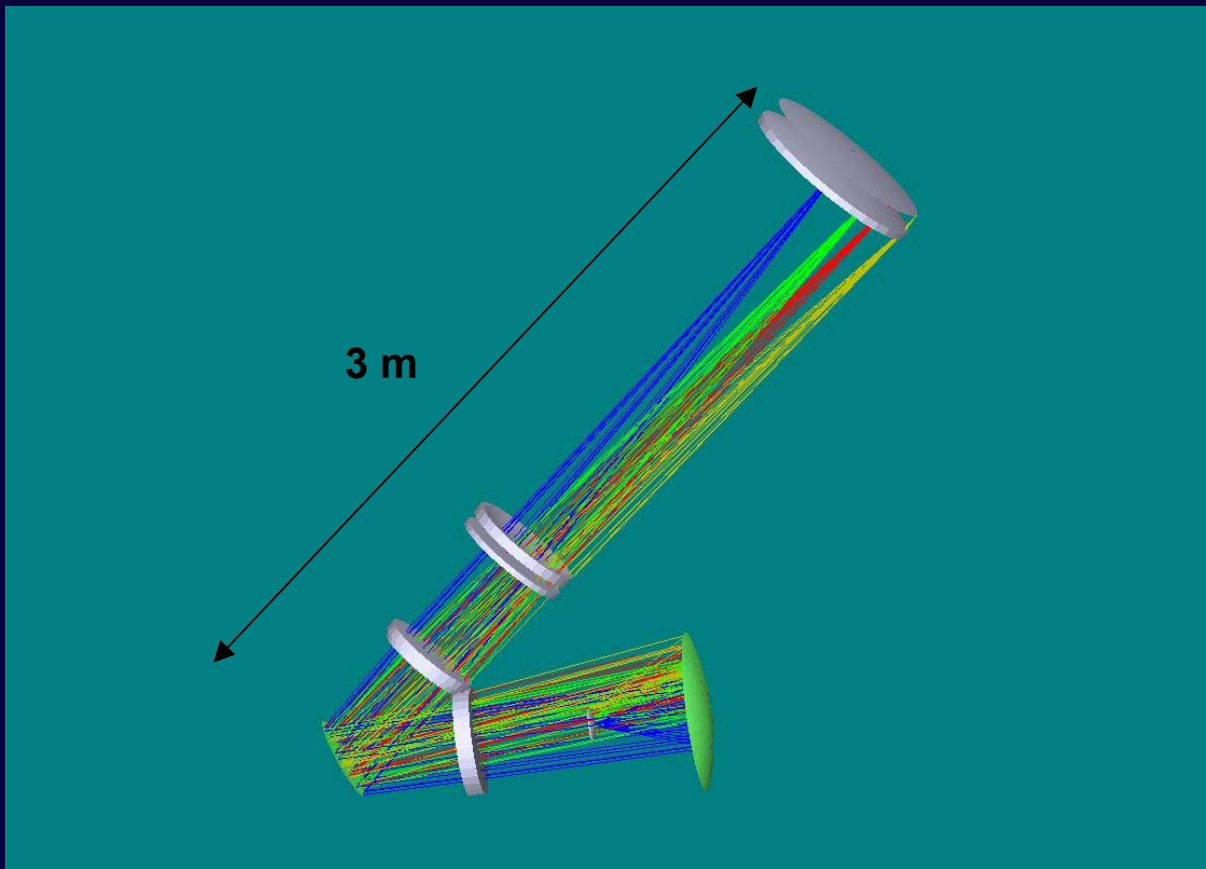
DRAWING NUMBER	SHT 1	REV
GMT15.DW2	OF 33	

All-Cass GMT Concept Design Front Quartering View

f1 = lateral translation @ 4 Hz
f2 = fore-aft translation 5.1 Hz
(higher w/add'l constraints)



GMT MOS Design

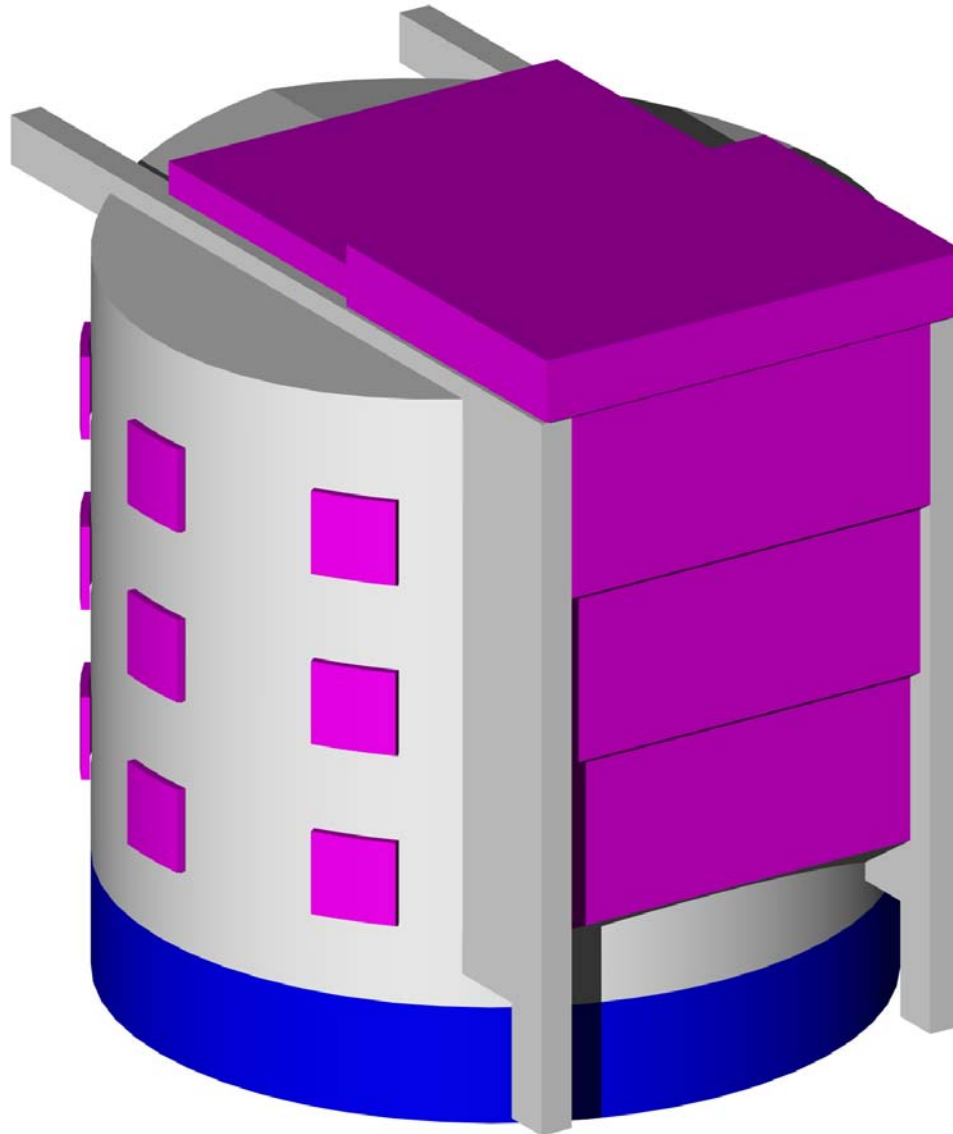


Features:

- 12 arcmin FOV**
- Schmidt Camera**
- 340 Φ mm beam**

Cylindrical Enclosure

45 m Height
above Az Track

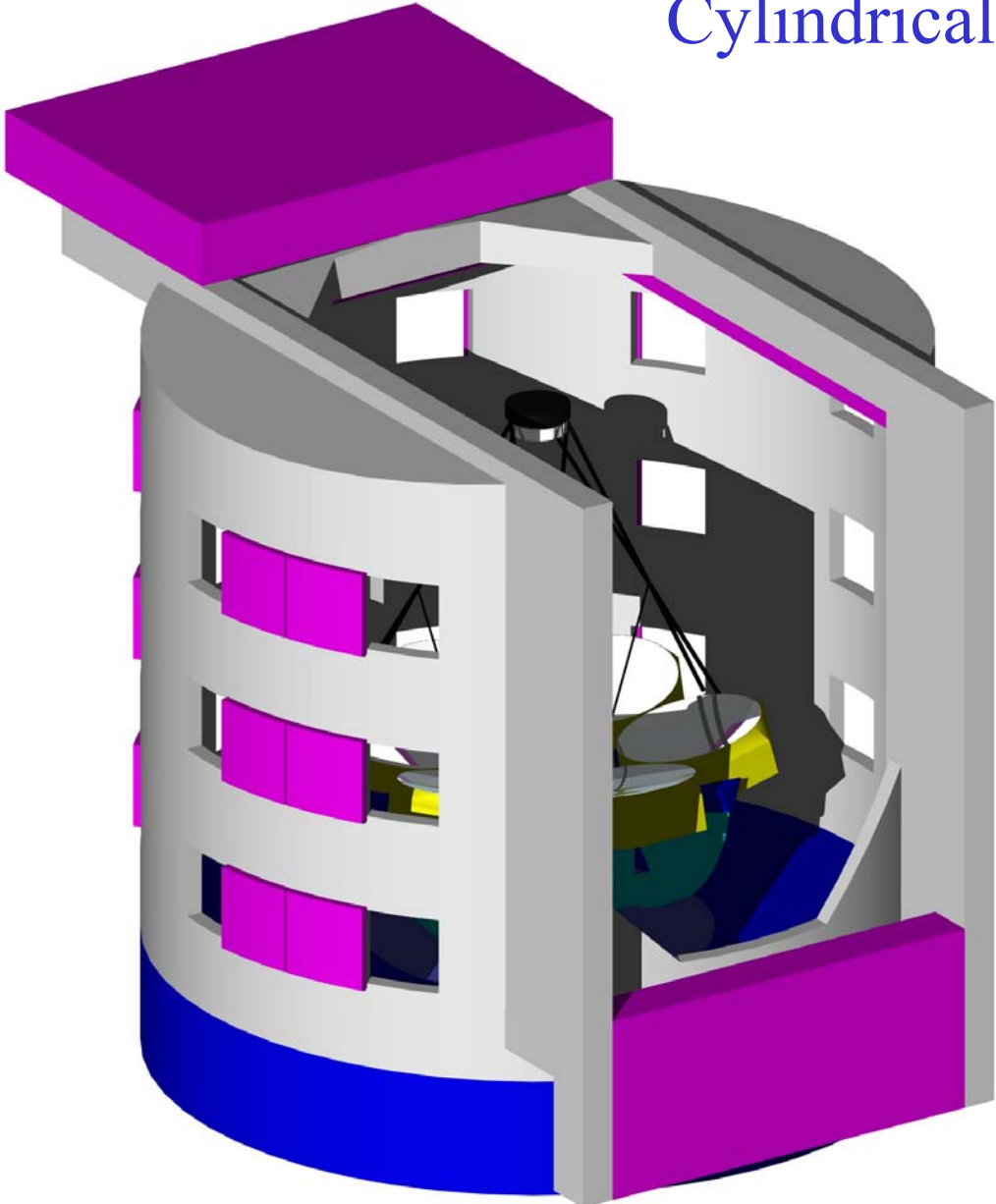


44 m Diameter

Cylindrical Enclosure

45 m Height
above Az Track

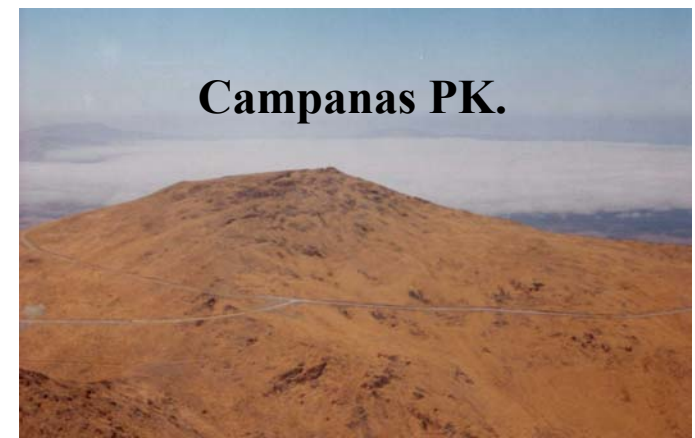
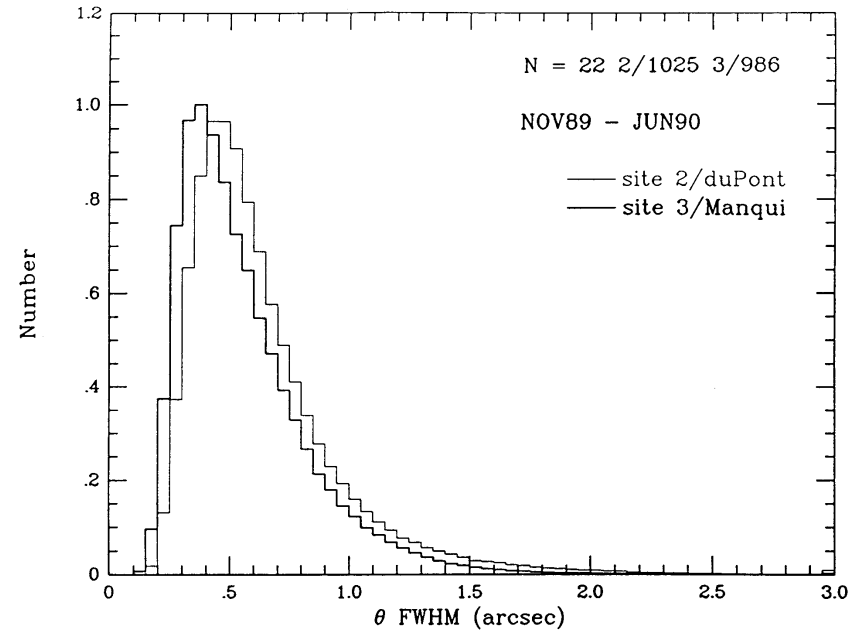
75T Service
Hoist



44 m Diameter

Las Campanas Sites

- Developed potential sites & infrastructure at LCO.

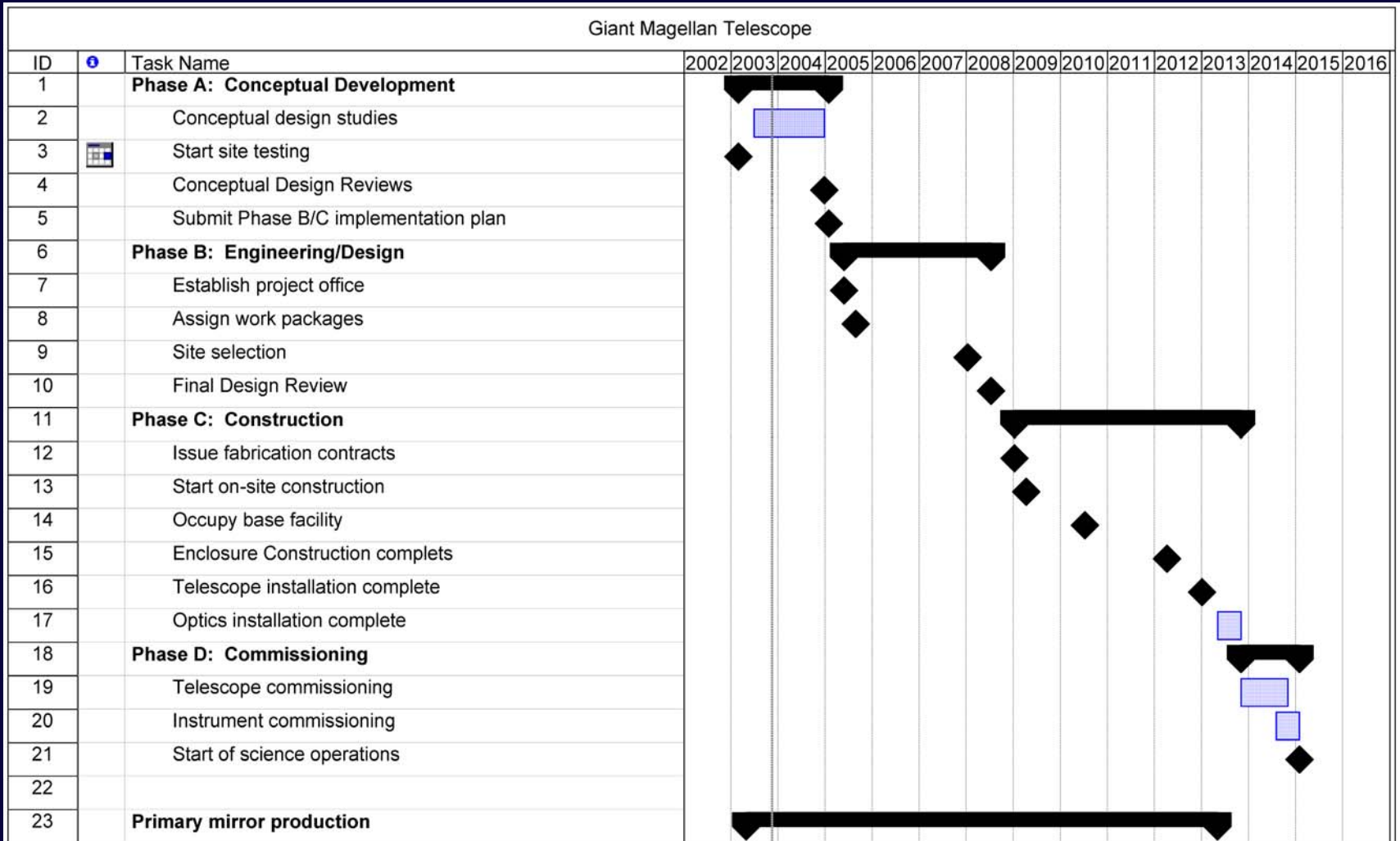


Site test data & operations going back well over a decade.

GMT SITE Testing Program

- **Coordinated effort with CTIO/NIO/TMT.**
 - Measurements will be made with similar equipment.
 - Data will be archived and shared.
- **Possible Sites**
 - Low-altitude coastal sites in northern Chile
 - Cerro Negro in the Chilean Science Preserve- (High altitude)
 - **Four sites on Las Campanas including Magellan for comparison.**
 - Evaluation sites on Cerro Tololo & Cerro Pachon.
 - Mauna Kea
 - San Pedro Martir
- **DIMMs, weather stations, MASS, & SODAR(?)**

GMT Schedule



Phase A Studies

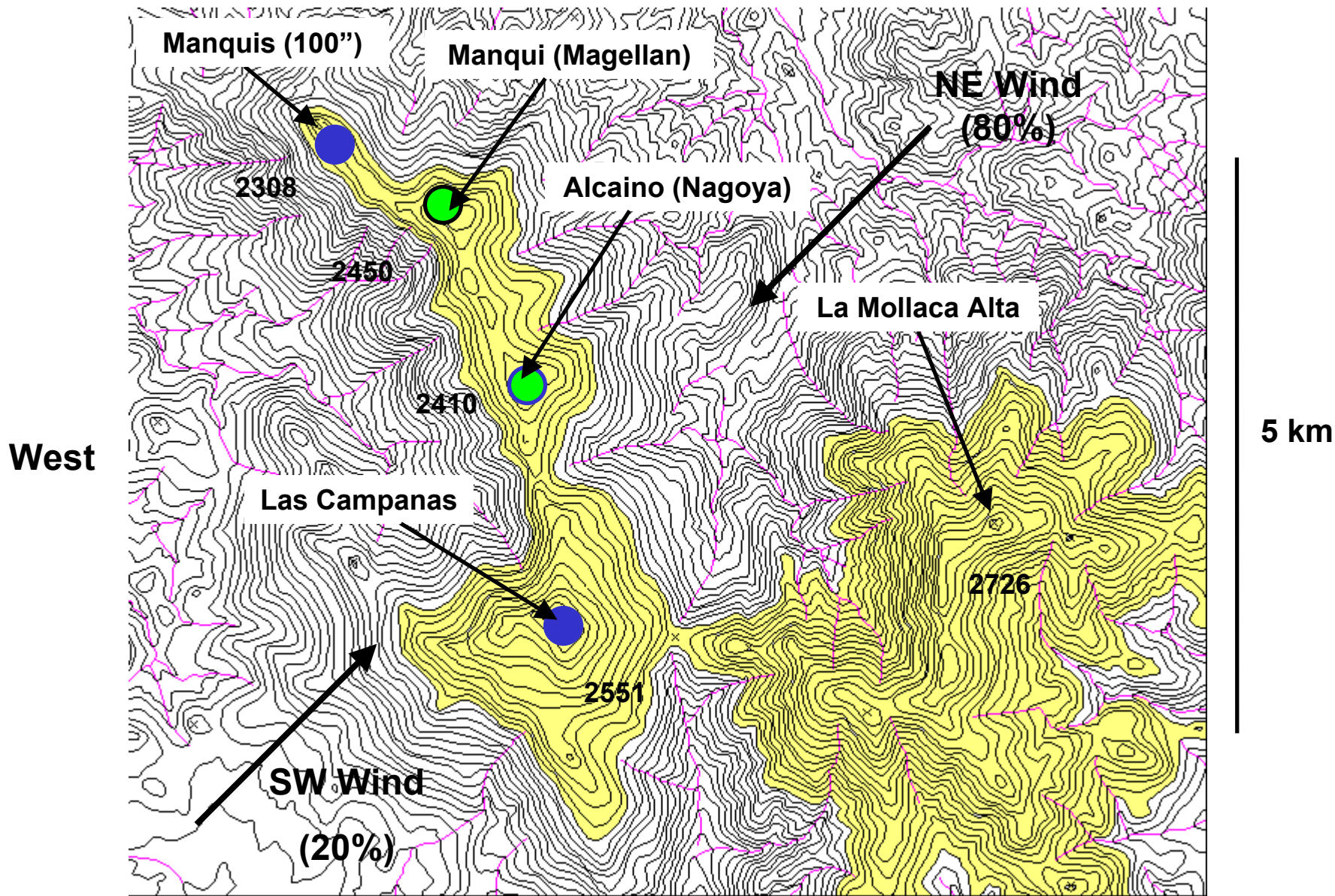
- Science case
- Primary mirror technology*
- Optical system design
- Telescope structure design
- Optical alignment & phasing
- Adaptive optics *
- Adaptive secondary mirrors *
- System modeling*
- Primary mirror supports
- *Mirror coating* *
- Instrument concepts *
- Enclosure studies*
- Site survey *
- Operations model
- Cost studies

Active development underway

Planned

*NSF/GSMT support

North



Seeing Towers: ● = existing ● = planned

Test Stations



- Differential Image Motion Analyzers (DIMMS) at each site.
 - Mounted in 12-15-m towers.
 - Persson/Babcock seeing monitor (ASM) is installed in Tower #2 alongside DIMM #1.
- Meteorological stations at each site.
 - Mast mounted.
 - Wind speed & direction, temperature, humidity, barometric pressure.
- Multi-Aperture Scintillation Sensor (MASS) at one site.
- All-sky camera (transparency, light pollution)
- SODAR?

Alternate Enclosure Concepts

- Co-rotating enclosure with roll-off service building.
- Callote

