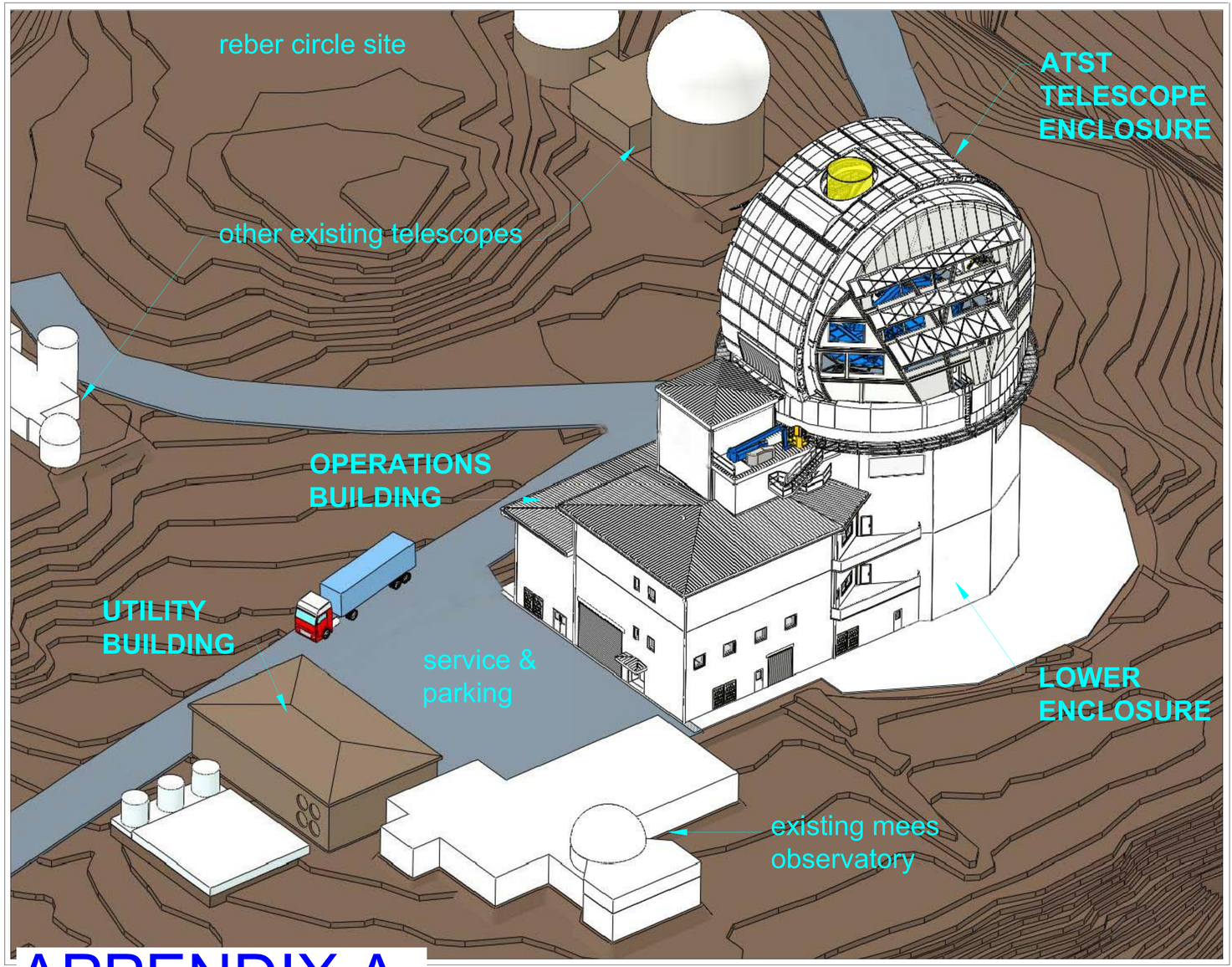

APPENDIX A
SCHEMATIC DESIGN of the
SUPPORT FACILITIES for the
Advanced Technology Solar Telescope

Haleakalā High Altitude Observatory Maui, Hawai'i

PROJECT INFORMATION:

- Land Classification: Conservation District, General Subzone
- Land Owner and Lead agency for Conservation District Use Permit: University of Hawaii, Institute for Astronomy (IfA)
- ATST Site Area: Approximately 0.9 acres (exact lease from IfA to be defined)
- Total Building Area: 44,454 sq.ft.
- Occupancy Class: Group B (2006 IBC)
- Construction: Type II-B

*Note: All Pier/Telescope areas and rotating portions of Enclosure are included in the table below to provide a complete summary of habitable building areas. These floor areas are, however, not included in the Support Facilities Contract. (see area diagrams on plans A1 to A7)

Floor Area Summary

Space Description	Gross Floor Areas							
	Ops. Bldg.		Enclosure*		Pier/Teles.*		Utility Bldg.	
	ft^2	m^2	ft^2	m^2	ft^2	m^2	ft^2	m^2
Telescope Level	669	62	4,016	373	1,329	124		
Azimuth Mech Level	671	62	2,270	211	880	82		
Utility Level	1,086	101	3,810	354	1,595	148		
Coudé Level	3,556	330	1,565	145	3,566	331		
Mezzanine Level	2,212	206	570	53	3,566	331		
Ground Level	5,319	494	1,648	153	3,566	331	2,560	238
TOTAL AREA (gross):	**13,513**	**1,256**	**13,879**	**1,290**	**14,502**	**1,348**	**2,560**	**238**
Total ATST Facility Area	**44,454** ft^2				**4,131** m^2			

Index of Drawings (30 sheets)

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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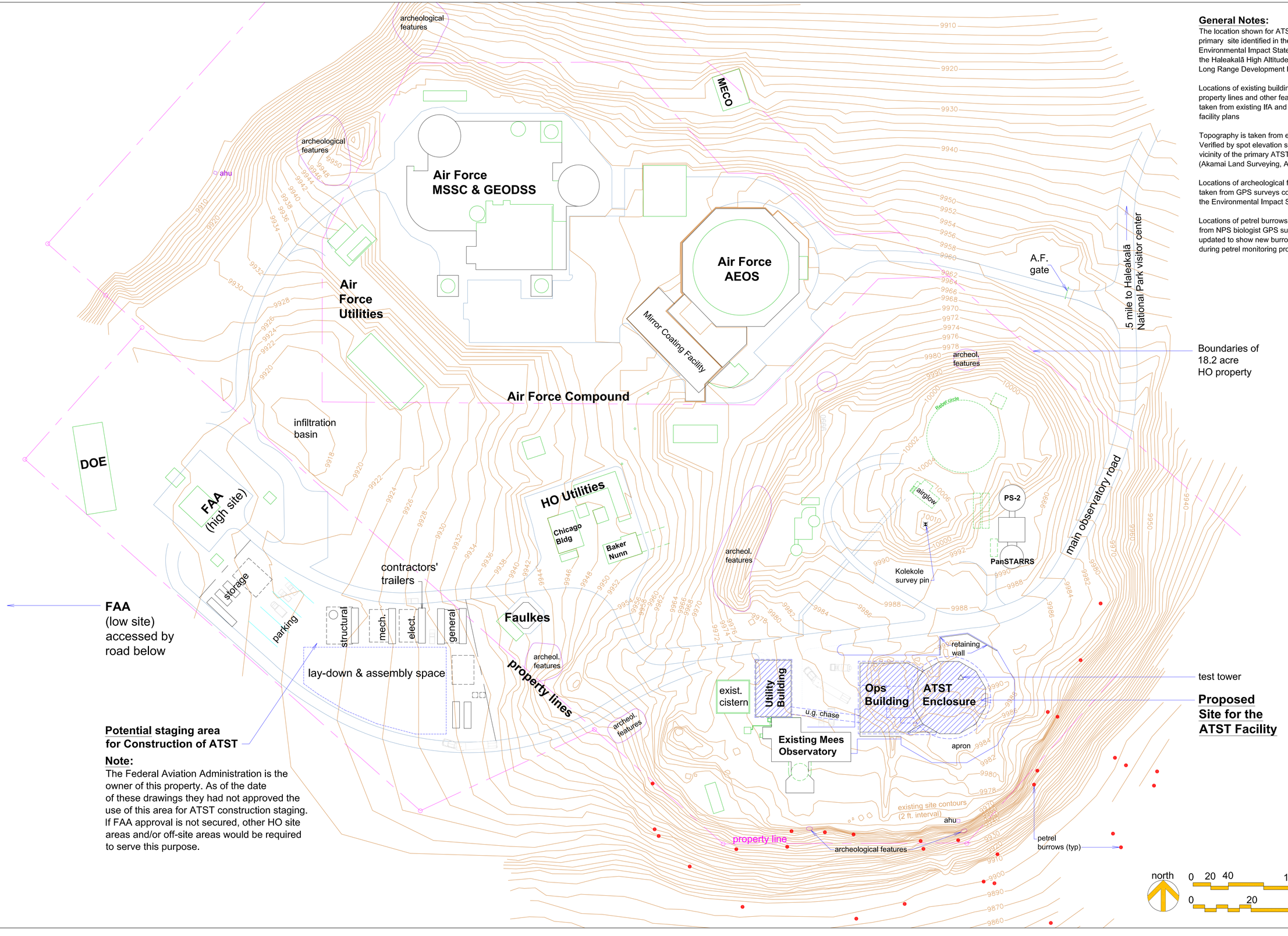
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

TITLE SHEET

size D no scale
rev B
ATST DWG-00124
sht T1 1 of 30



General Notes:

The location shown for ATST is the primary site identified in the Environmental Impact Statement and in the Haleakalā High Altitude Observatory Long Range Development Plan

Locations of existing buildings, roads, property lines and other features are taken from existing IfA and Air Force facility plans

Topography is taken from existing plans. Verified by spot elevation survey in the vicinity of the primary ATST site (Akamai Land Surveying, April 2005).

Locations of archeological features are taken from GPS surveys conducted for the Environmental Impact Statement.

Locations of petrel burrows are taken from NPS biologist GPS survey and updated to show new burrows found during petrel monitoring program

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

OVERALL SITE PLAN

size D
rev B
scale: 1"= 50'
ATST DWG-00124
sht C1 2 of 30

incoming primary electric service

Substation No. 45
(to be upgraded - location TBD)

MECO

archeological features

ahu

Air Force MSSC & GEODSS

existing U.G. electric service lines to observatories

Air Force AEOS

Air Force Utilities

Mirror Coating Facility

A.F. security gate

archeol. features

Air Force Compound

New service from MECO substation to proposed ATST site - 2 alternate routes shown

Reher circle

Possible alternate routing of new ATST service - following exist lines as much as possible

infiltration basin

airglow

main observatory road

PS-2

HO Utilities

Chicago Bldg

Baker Nunn

zodiacal light

Solar C

PanSTARRS

FAA (high site)

archeol. features

approx location of exist u.g. electric lines

New ATST electrical service & transformer

Temporary utilites to staging area as arranged for by Contractor

Faulkes

archeol. features

property lines

peripheral electrical grounding ring

retaining wall

exist. cistern

Utility Building

Ops Building

ATST Enclosure

u.g. chase

Existing Mees Observatory

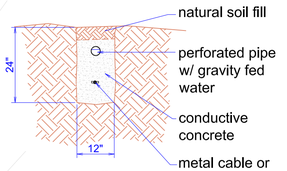
concrete apron

wastewater treatment plant

grounding field

grounding ring & field - conductive concrete strips in 1 ft. x 2 ft. deep trenches (see detail)

infiltration well



Grounding Trench Detail

north

0 20 40 120 ft.

0 20 40 m

New Electric Service for ATST:

All new service lines will be underground

New service to the proposed site (adjacent to Mees) will generally follow the path of existing service lines in order to minimize excavation of previously undistubed soil.

New service will utilize existing conduits and pull boxes wherever possible. New ducts and boxes will be installed where capacity or condition of existing are inadequate.

New lines will be routed around identified archeological features.

Required new service capacity for ATST is approximately 960 kVA

Wastewater Treatment Plant:

New wastewater treatment plant will be a small commercial unit (<1000 gal/day) as manufactured by Jet Inc., EWMS Inc. or equal

Plant will utilize aeration and biologically accelerated treatment to acheive required water quality standards

To be approved by State Dept of Health

Electrical Grounding System:

System indicated on the plan and in the detail below is preliminary. Final methods and details are to be determined through a consulting contract with a lightning protection specialist.

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checked: M. Warner
approved: J. Wagner
August 20, 2009

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

ELECTRICAL, GROUNDING & WASTEWATER SITE PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 40'
rev B
ATST DWG-00124
sht C2 3 of 30

Air Force AEOS

Air Force Utilities

Air Force Compound

existing infiltration basin

FAA

Large boulders and soil from ATST excavation may be placed around areas within the HO property for security, for natural effect and to reduce soil erosion

Some silt and sand material may be removed from infiltration basin area and used to augment backfill around ATST structures. Some large rock and boulders may be placed in and around infiltration basin. Any such modifications would be designed to improve the percolation of the basin area and to reduce erosion caused by surface flow on adjacent slopes

existing drainage channels & pipes - IfA to maintain as required.
The ATST project will not direct any new water flow through this system to the existing infiltration basin

HO Utilities

Chicago Building

Baker Nunn

existing drywells placed to reduce surface run-off and erosion

archaeological features

arch. features

arch. features

Reber circle

airglow

Kolekole monument pin

PS-2

PanSTARRS 1

zodiacal light

Solar C

Faulkes

Primary Soil Placement Area

spread over open area
average 4 ft. deep
5400 cu.yd. max.

revised contours

archeol. features

property lines

archeol. features

new area drains and dry wells at exterior paved surface areas of ATST facility

water from roof surfaces collected in storage tanks under Utility Building and pumped to cistern

main observatory road

retaining wall

rain water collected at base of enclosure to 40,000 gal. u.g. holding tanks under Utility Bldg. or apron then pumped to cistern

exist. cistern

Utility Building

u.g. chase

cistern water pumped to Mees & ATST for domestic use

Proposed ATST Site

Existing Mees Observatory

alternate location for water storage tanks

approximate extent of excavated level pad

ahu

archeol. features

Petrel Burrows
Comply with monitoring requirements and seasonal restrictions for all site work

Use of Primary Soil Placement Area shown requires approval by the FAA. If approval is not granted, other areas on the HO property will be utilized for the placement of excess soil, as indicated in notes above and otherwise determined in final civil design.
At the area shown, or any other placement area, existing drainage swales are to be kept clear and access provisions are to be maintained.

0 10 20 60 ft.
0 10 20 m
north

General Notes:

- Any clearing and repair work of existing drainage channels and pipes is to be coordinated with IfA and other site users.
- Most of the volcanic sand and gravel that is excavated for ATST construction will be utilized as backfill around the ATST structures.
- Cultural Monitor will be consulted regarding all excavation and soil placement activities
- Refer to Grading and BMP Plan (sht C5) & Building Layout Plan (sht C6) for initial leveling and finish contours around ATST facility.

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

STORMWATER CONTROL & SOIL PLACEMENT SITE PLAN

ATST advanced technology solar telescope

size D scale: 1"= 30'
rev B
ATST DWG-00124
sht C3 4 of 30

to Reber circle

Solar C

110' crane reach radius

80' crane reach radius

PanSTARRS 1

existing access road

exist walk

archaeological features

Close Staging Area

temporary widening as required

main observatory access road

Close Staging Area

alternate crane location

Crane

retaining wall

new ice tanks

ATST OPERATIONS BUILDING

test tower

ATST ENCLOSURE

ATST Utility Bldg.

exist. cistern

expand existing paved service & parking area

u.g. chase

back road to potential staging area (on FAA lease)

archaeol. features

EXISTING MEES SOLAR OBSERVATORY

alternate crane location

concrete apron

SLR 2000

approximate extent of main construction area

existing site contours (2 ft. interval)

ahu

archaeol. features

archaeol. features

Petrel Burrows

Closest petrel burrows are to be monitored for noise and vibration in accordance with the specific procedures, threshold levels, and notification protocols described in ATST SPEC-0030, (based on the Informal Consultation Document of the USF&WS)

Pathway to ahu is to remain open and safe for visitor pedestrian traffic at all times during the construction project

WIND ROSE
29%
19%
12%
7%
6%
8%
10%
7%

north

0 10 20 60 ft.

0 10 20 m

General Notes:

This site is identified as the primary location for ATST in the HO Long Range Development Plan and the Draft Environemtal Impact Statement. Environmental analysis has not identified impacts that alter that designation.

Investigation of this site has included:

- Extensive testing of weather & seeing conditions
- Soil borings and lab testing of samples
- Initial site survey to verify topography
- GPS location of nearby petrel burrows
- Field determination of appropriate building location & ground floor elevation
- Wind & CFD analysis to determine building orientation to minimize thermal turbulence

The area for placement of the main ATST facility is previously undeveloped, and has no known underground utilities

Further, site-specific survey work will be done in consultation with the civil work design team to refine and verify:

- Existing local topography
- Relationship to existing structures
- Existing utility locations

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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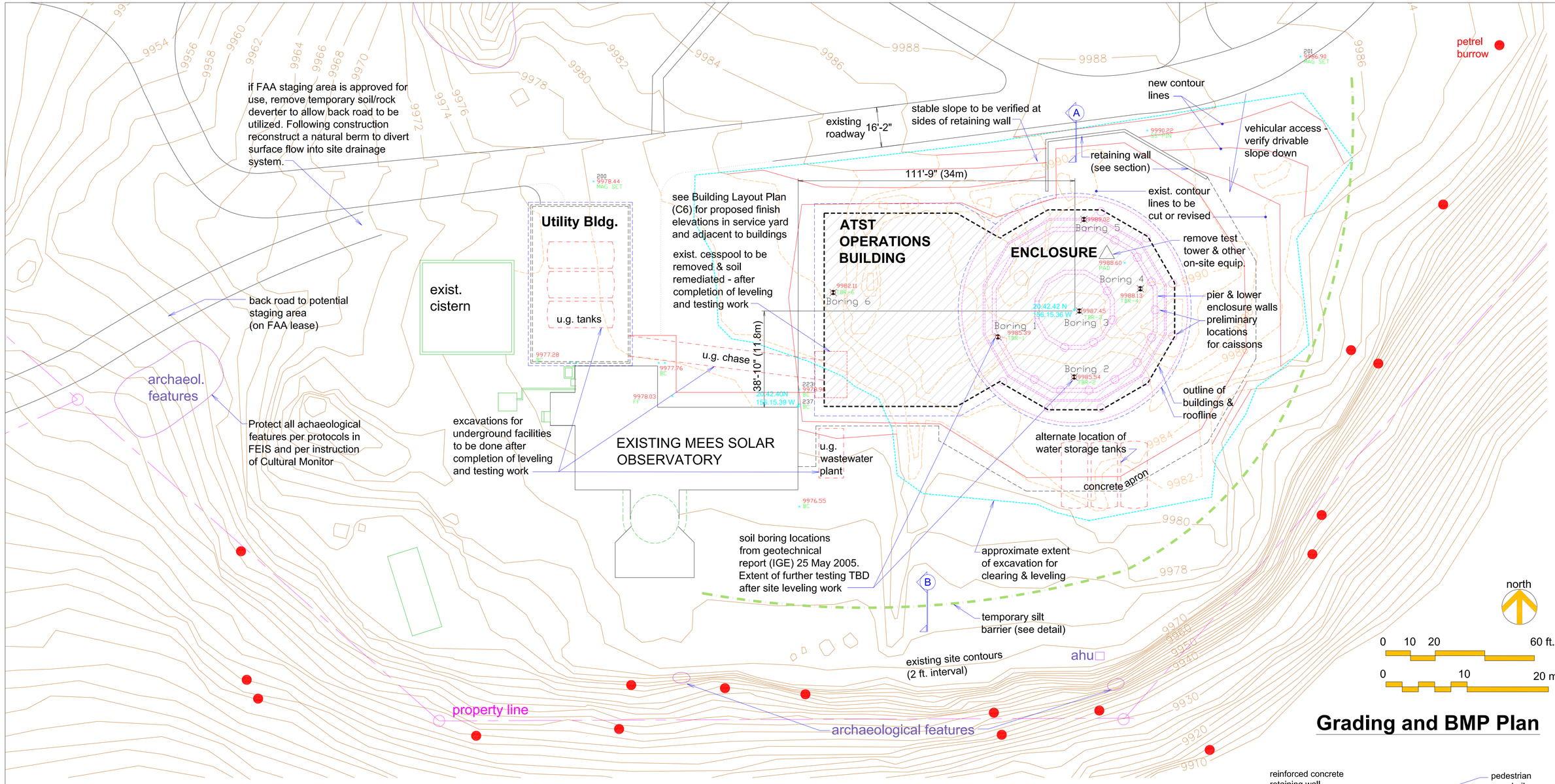
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

LOCATION SITE PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 20'
rev B
ATST DWG-00124
sht C4 5 of 30



Grading and BMP Plan

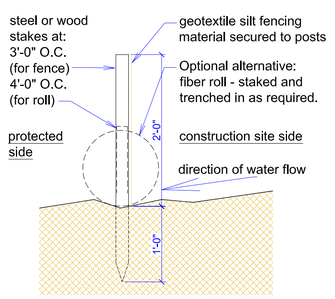
General Notes on Excavation and Best Management Practices (BMPs)

During the grading of the site for ATST as indicated and during all subsequent construction of the ATST facilities, BMPs will be implemented to minimize stormwater runoff, protect adjacent areas, and to ensure no injurious effect on groundwater.
These measures will include all BMPs specified or referenced in the following documents:

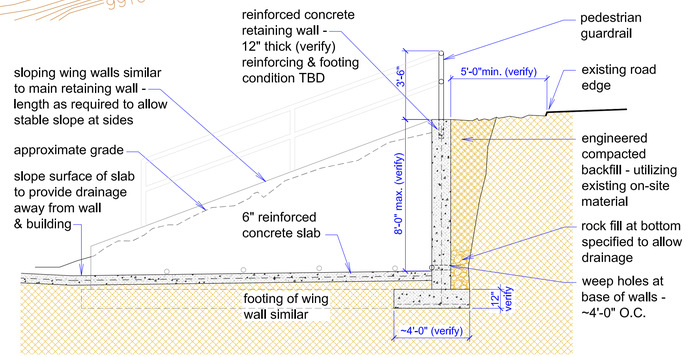
- Final Environmental Impact Statement (FEIS) for the ATST project
- Stormwater Masterplan for HO (Volume II, Appentix L of the FEIS)
- NPDES General Permit for Discharge Associated with Construction Activities (application pending completion of FEIS)

In addition to the measures shown on the plan, specific BMPs will include, but not be limited to, the following:

- During early construction temporary diverters shall be utilized to direct surface water flow to the existing stormwater drainage system.
- As soon as possible, the permanent system shall be installed to capture rainwater in underground tanks and the cistern.
- Portable toilets with containment tanks shall be utilized during construction work.
- A Cultural Monitor shall be on site during all leveling and excavation activities to prevent damage to cultural resources.
- Native soils shall be used to fill holes upon completion of construction.
- Excavated areas, and soil deposition areas shall be replanted with native vegetation to prevent erosion.
- Dust control shall be done by watering the disturbed ground using non-potable water trucked to the site by the contractor specifically for that purpose. Potable water shall not be used for dust control.



B Silt Barrier Detail
1" = 1'-0"



A Retaining Wall Section
¼" = 1'-0"

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

GRADING & BMP (best management practices)
PLAN & DETAILS

size D | scale: 1"= 20'
rev B
ATST DWG-00124
sht C5 6 of 30

existing drainage channel

9977.0 invert

existing main observatory road

19'-6"

50' turning radius for trucks
A&E to verify accessibility

40'-0"

78'-2"±

60'-4"

82'-0"

32'-10"

retaining wall
(see detail sht. C5)

A S3

trench drains

dry wells as required
for surface drainage
of paved service area

service & parking area

9979.5

C A12

exterior utility area

generator

elec. equip.

underground water tanks

ice tanks

Existing Cistern

chillers

heat exchangers

9977.8

area drain for service yard

operations building

Multi-use shop area or alternate location for coating facility

fan

Air Handling Unit (N.I.C.)

potential future coating facility

spot elevations

9979.0

mirror box

9980.0

78'-4"

64'-0"

cond.

drain

utility building

9978.1 FFE

9980.5 FFE

Receiving & Mirror Prep

B A11

Platform Lift

cable wrap

9980.5 FFE

9980.4

9980.2

B A11

fan

air comp.

9978.0

expanded paved service yard

storage & service area in base of piers

elev.

elev. equip.

drain

Mech. Equipment Area

telescope pier

underground chase

9978.1 FFE

utility chase

fan

lower enclosure

11.8 m (38'-10")

Shop
(Modifications N.I.C.)

ramp up

louver
(typ.of 4)

C A12

10'-4"

lab

existing Mees solar observatory

control dimensions

34 m (111'-9")

kitchen

offices

waste treatment plant

A S3

underground water tanks
(alternate location)

concrete apron

Notes:

- Building orientation and layout is based on analysis of wind flow around structures and site space restrictions.
- Location control and overall building dimensions are as depicted in environmental impact analysis documents.
- Elevation of ground floor level of S&O Building is 9980.5' (~2'-5" ft. higher than Mees building floor level)
- Elevation of Utility Building floor is level with Mees building floor ~9978.1

north

0 5 10 20 30 ft.

0 5 10 m

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checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

BUILDING LAYOUT PLAN

ATST advanced technology solar telescope

size D rev B scale: 1"= 10'

ATST DWG-00124

sht C6 7 of 30

Notes:

Foundation methodologies indicated are preliminary - based on:
- previous observatories constructed on volcanic soils
- available soils data (IGE report)
- foundation study by M3 Engineering

Foundation systems for telescope pier, enclosure and buildings shall be developed by A&E as a comprehensive system.
Utility tunnel design shall be coordinated with project wide mechanical & electrical systems

Existing Road

Concrete floor slabs for Utility and S&O buildings (provided as required for phased construction)

Raised Interior Equipment Pads - To facilitate use of building as a shop during construction provide thickened slab under entire building and pour pads on top at later date as needed for equipment

Utility Building

underground water holding tanks (40,000 gallon min total capacity)

existing cistern

hatch

pad footings at building columns (typ)

rainwater catchment piping

design of walks ramps & aprons at openings to be refined by A&E, installed at site completiion phase

underground utility chase

conduit to exist. lab

Existing Mees Building

Receiving & Staging Area

Pad footings at building columns (typ)

Operations Building

Platform Lift ~48" pit

elevator ~48" pit

dimensions and structural conditions of pits to be verified with equipment vendors

toe-down footings (typ)

equipment pads (verify w/ mech.)

u.g. piping for catchment of rain water from enclosure and building roof

trench drains continuous around exterior walls of enclosure to capture rain water

Caissons under enclosure columns

Ring Mat foundation for enclosure

8" isolation joint

Enclosure

isolated concrete caisson/columns to support AHUs (verify w/ mech.)

Mat foundation under pier

Base of Piers

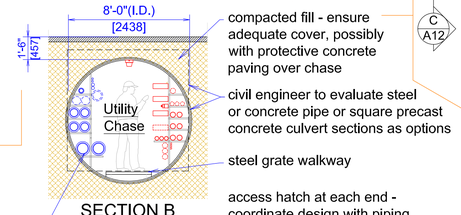
Caissons under pier walls

trench drains

Separate concrete floor slab of enclosure & pier, on top of foundations, to be provided as part of building work

concrete apron & trench drains to be installed in site completion phase

alternate location for water storage tanks



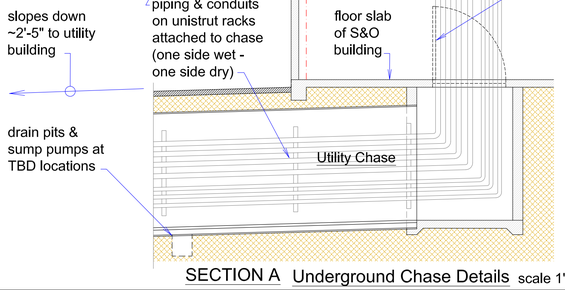
SECTION B

compacted fill - ensure adequate cover, possibly with protective concrete paving over chase

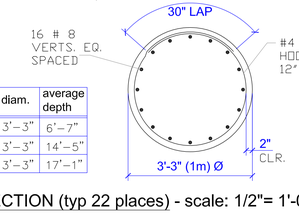
civil engineer to evaluate steel or concrete pipe or square precast concrete culvert sections as options

steel grate walkway

access hatch at each end - coordinate design with piping



SECTION A Underground Chase Details scale 1"= 5'-0"



caisson number	quantity	diam.	average depth
C1	4	3'-3"	6'-7"
C2	9	3'-3"	14'-5"
C3	8	3'-3"	17'-1"

CAISSON SECTION (typ 22 places) - scale: 1/2"= 1'-0"

north

0 5 10 30 ft.

0 5 10 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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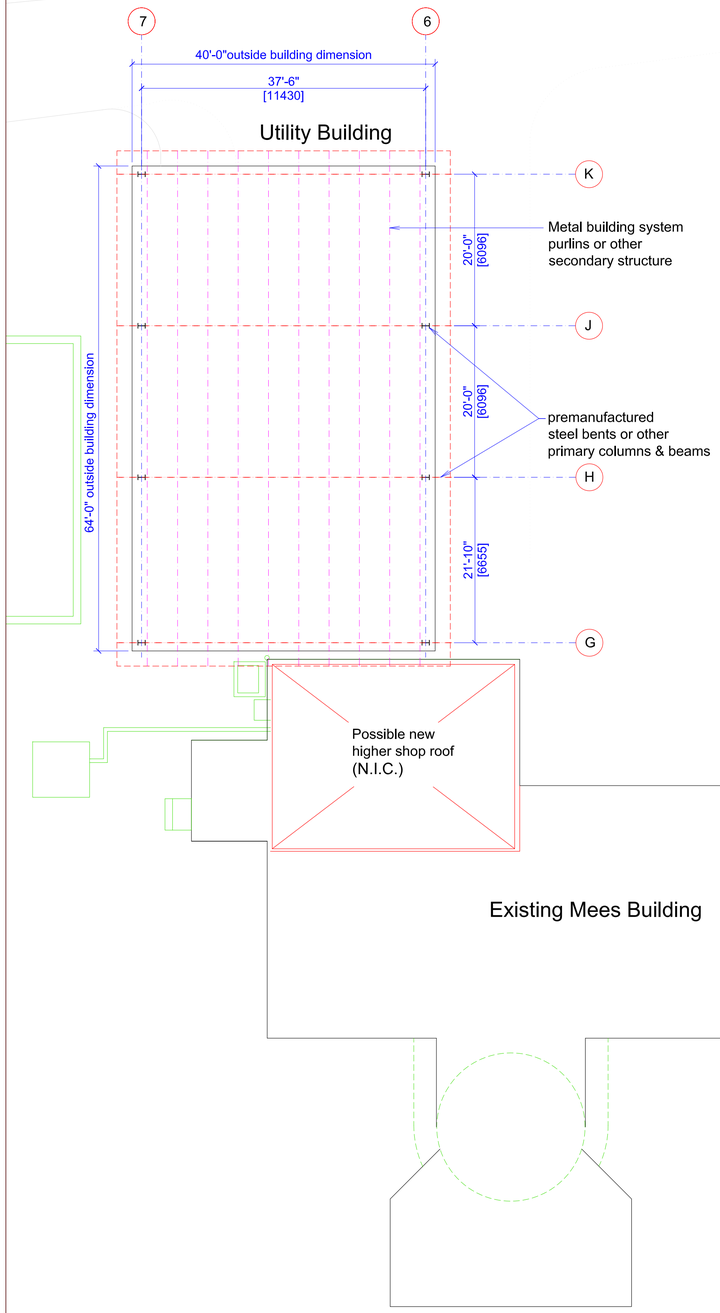
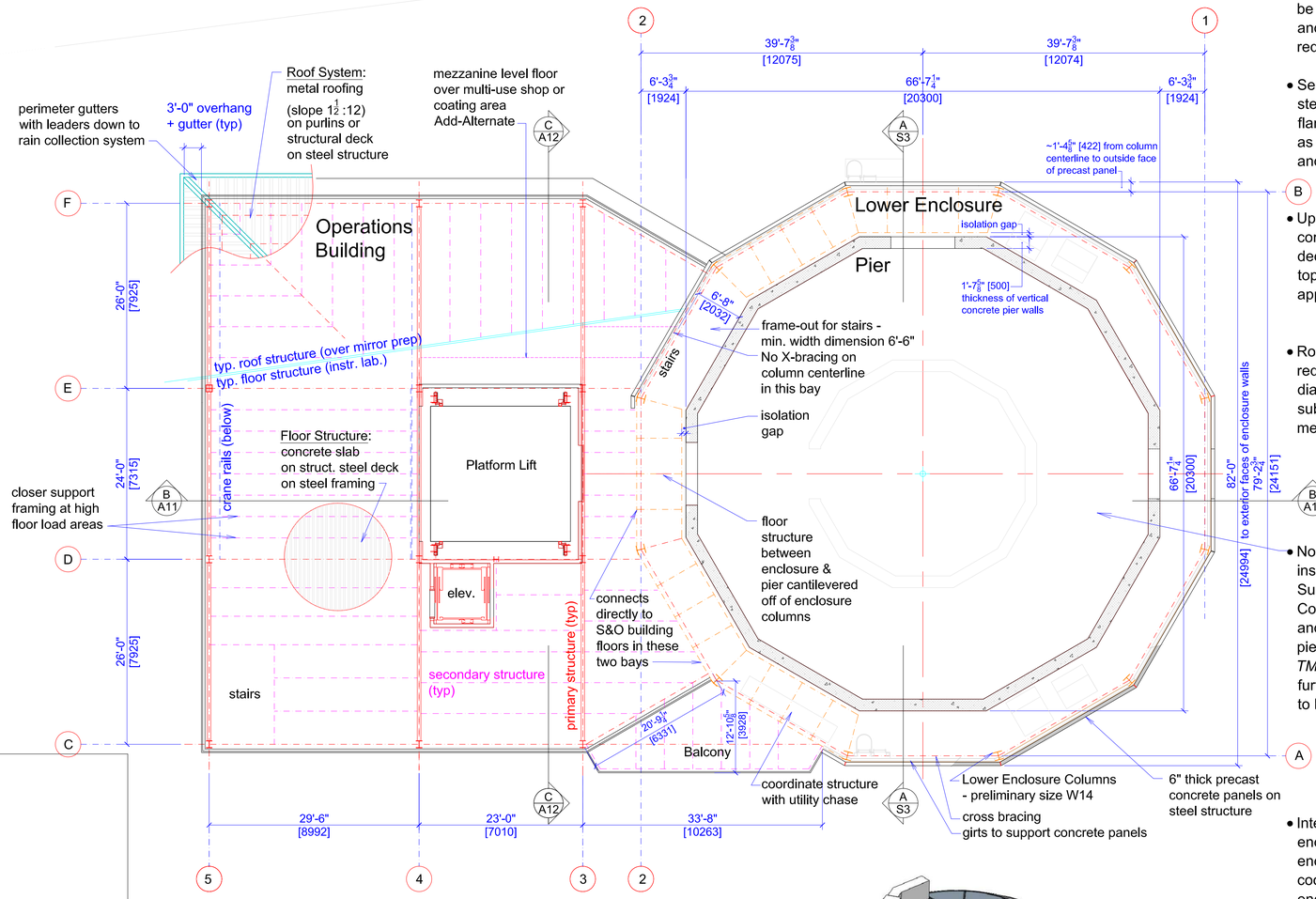
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

FOUNDATION PLAN

ATST advanced technology solar telescope

size D scale: 1"= 10'
rev B
ATST DWG-00124
sht S1 8 of 30





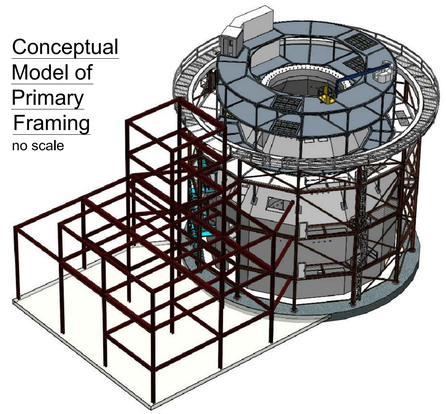
Composite Framing Plan

1"= 10'-0"

- Plan depicts structural framing conditions at Coudé Level and major adjacent structural elements.
- Structural conditions at Mezzanine & Utility levels of S&O Building are similar to framing systems shown here but cover smaller floor areas - as shown on sheets A2 & A5
- Structrual framing concept of upper levels inside lower enclosure is shown on the respective floor plans

Conceptual Model of Primary Framing

no scale



Notes:

- Primary steel structure to be wide flange columns and beams sized as required
- Secondary framing to be steel cross beams - wide flange, channels, or other as dictated by economy and structural depth
- Upper level floors to be corrugated structural steel decking with concrete topping or other appropriate floor substrate
- Roof decking to be as required for lateral force diaphragm and to provide substrate for standard metal roofing.
- No structural framing inside pier is included in Support Facilities design. Coudé rotator platform and other systems inside pier are by others. See *TMA to Buildings ICD* for further definition relevant to Building contract
- Interface of lower enclosure to rotating enclosure above to be coordinated with enclosure designer & contractor
- Refer to *Enclosure to Buildings Interface Control Document* for definition relevant to Building contract

north

0 5 10 30 ft.

0 5 10 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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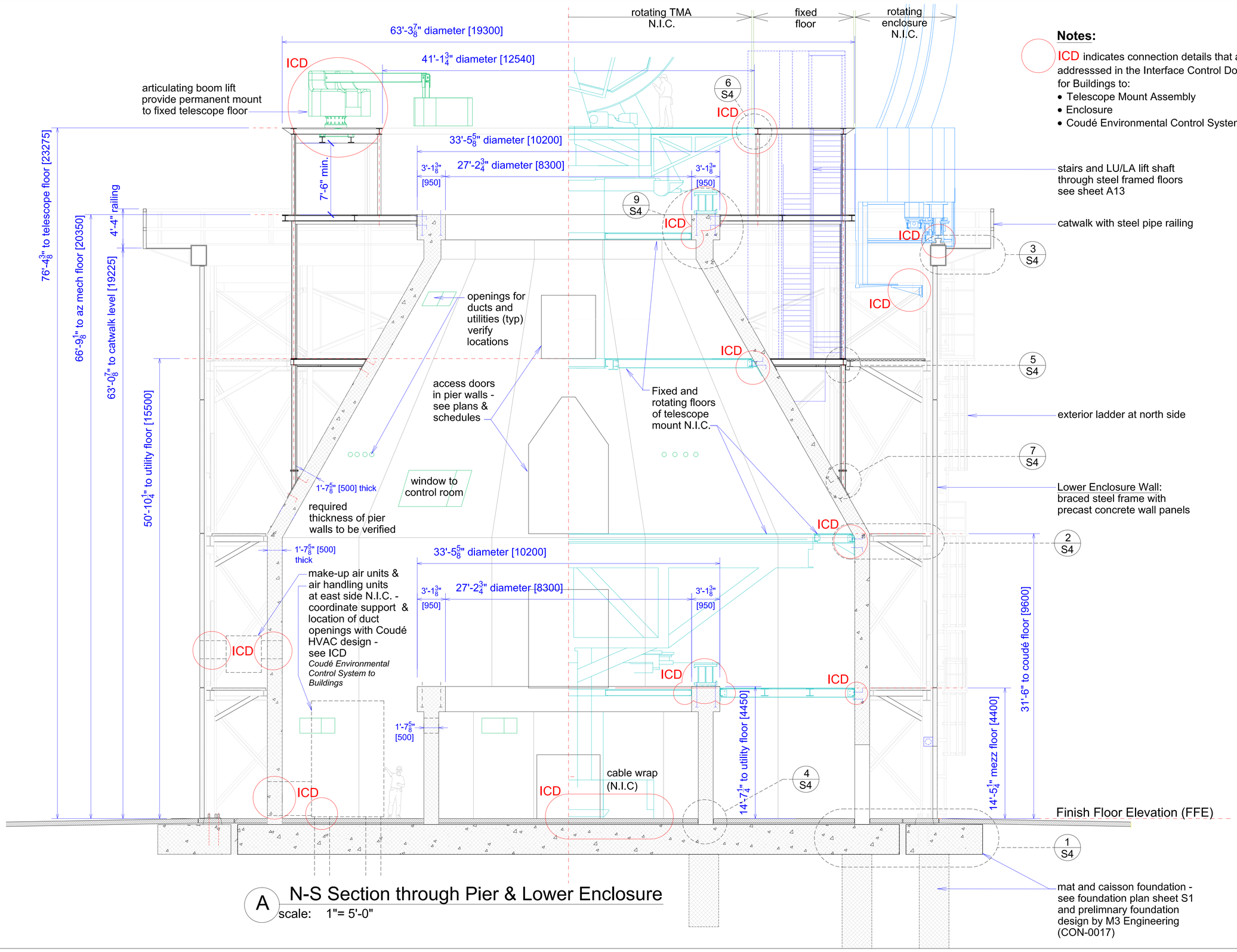
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

STRUCTURAL FRAMING PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 10'
rev B
ATST DWG-00124
sht S2 9 of 30



Notes:

ICD indicates connection details that are addresssed in the Interface Control Documents for Buildings to:

- Telescope Mount Assembly
- Enclosure
- Coudé Environmental Control System

A N-S Section through Pier & Lower Enclosure

scale: 1"= 5'-0"

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

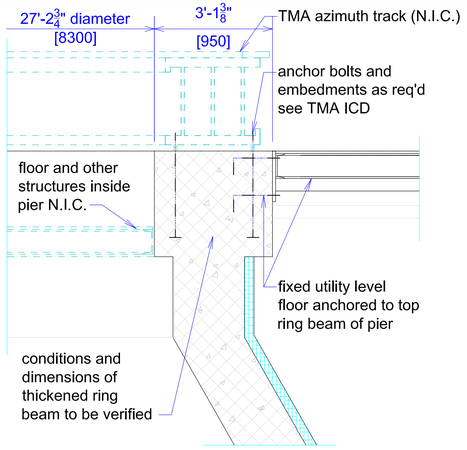
STRUCTURAL SECTION
PIER & LOWER ENCLOSURE

ATST advanced technology solar telescope

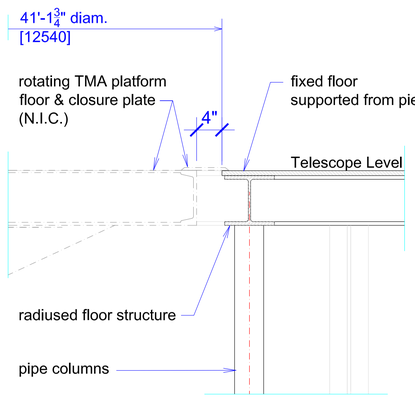
size D | scale: 1"= 5'
rev B

ATST
DWG-00124

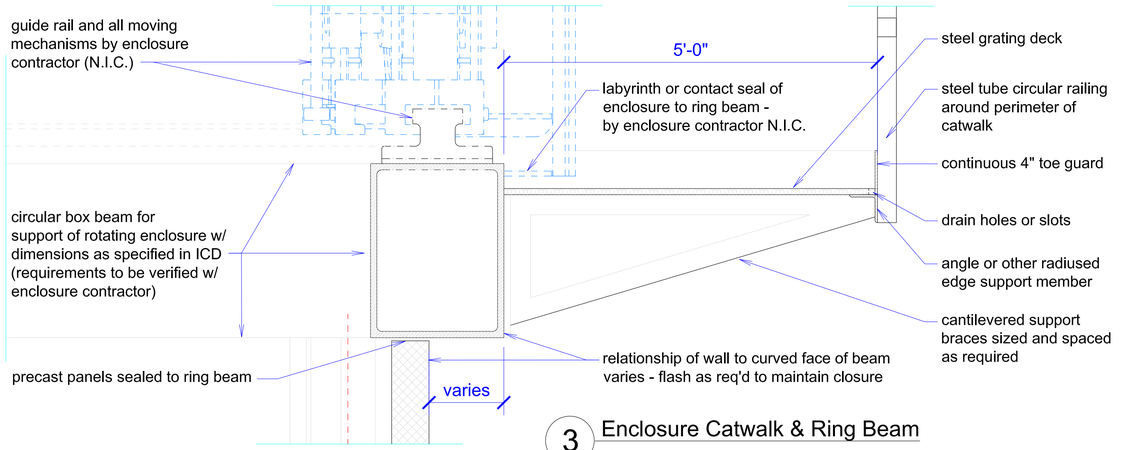
sht S3 10 of 30



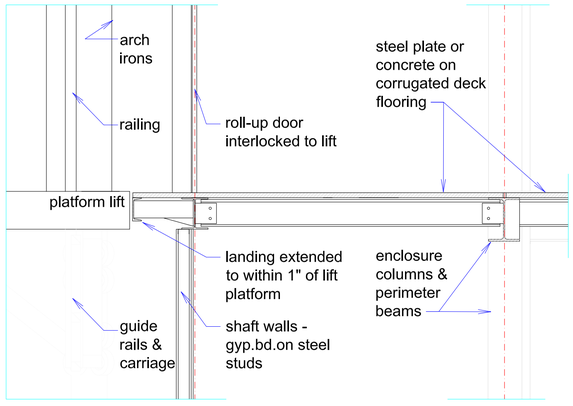
9 Pier Ring Beam at Telescope (Coudé sim.)
½" = 1'-0"



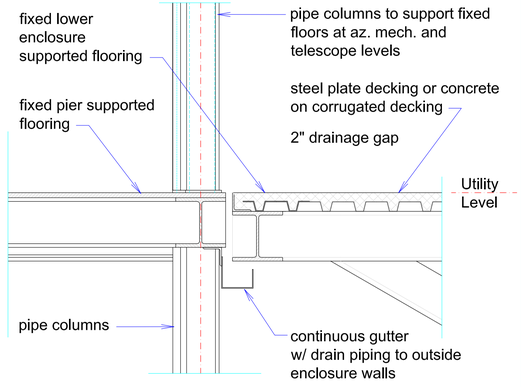
6 Rotating TMA Mount Floor to Fixed Telescope Floor 1" = 1'-0"



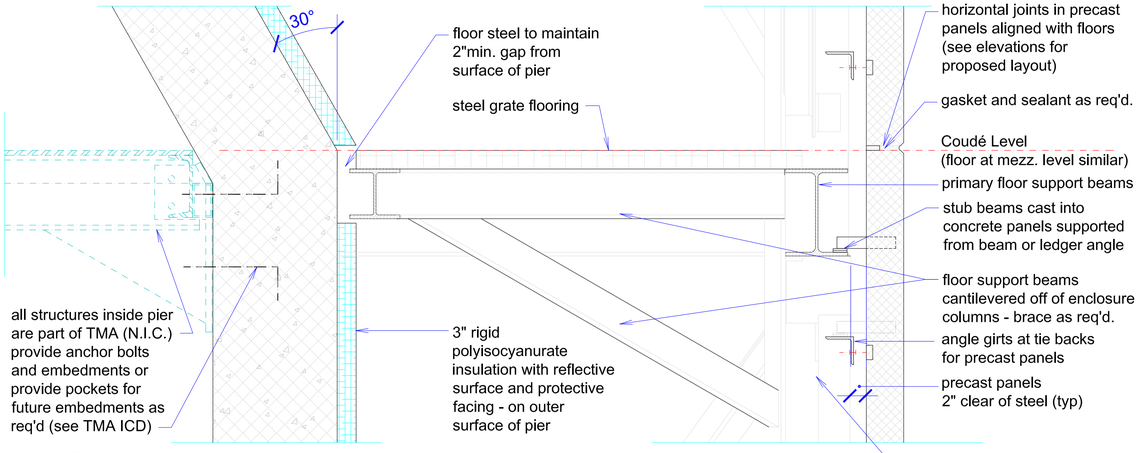
3 Enclosure Catwalk & Ring Beam
1" = 1'-0"



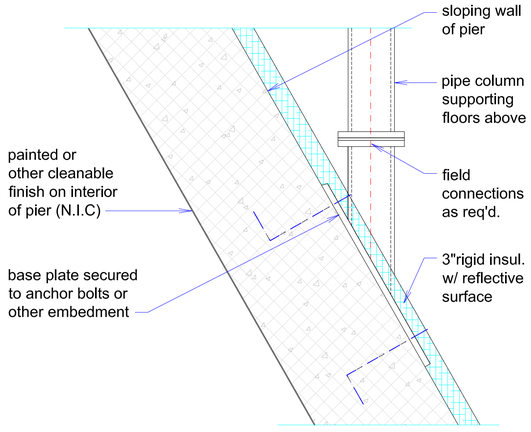
8 Lift to Vestibule to Lower Enclosure Floor
½" = 1'-0"



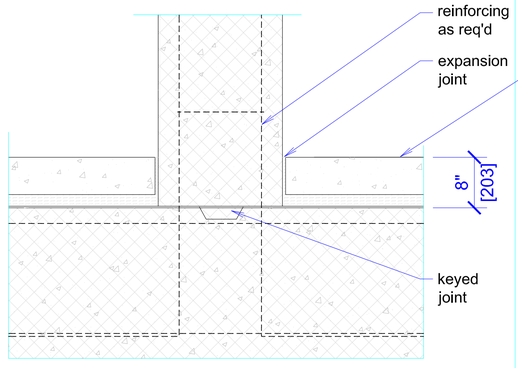
5 Utility Floor at Support Column
1"= 1'-0"



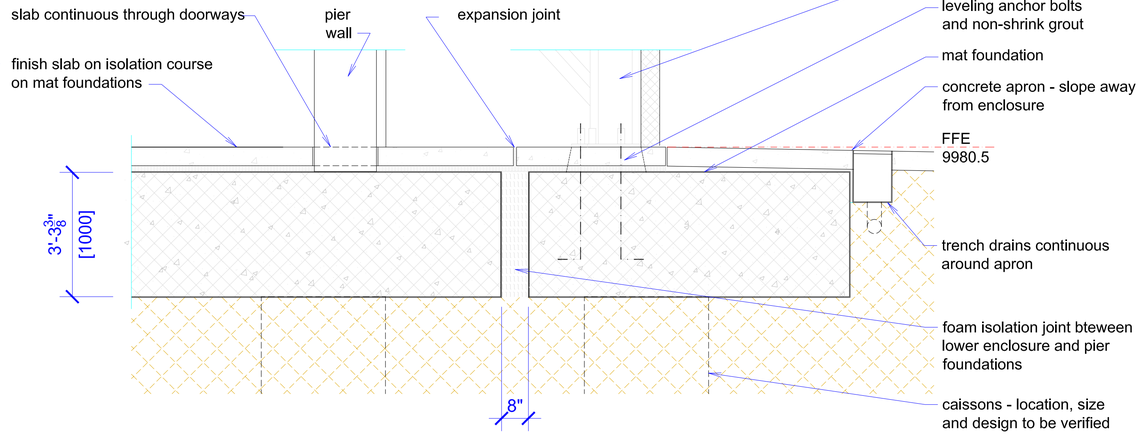
2 Pier & Lower Enclosure Walls at Coudé Floor (condition at mezz floor similar)
1"= 1'-0"



7 Column for Upper Floor Support
1" = 1'-0"



4 Typical Pier Wall to Foundation
1" = 1'-0"



1 Typical Foundation Conditions for Pier and Lower Enclosure Columns
½"= 1'-0"

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

NATIONAL SOLAR OBSERVATORY
operated by the
ASSOCIATION of UNIVERSITIES for RESEARCH in ASTRONOMY
under cooperative agreement with the
NATIONAL SCIENCE FOUNDATION

Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

STRUCTURAL DETAILS
PIER & LOWER ENCLOSURE

ATST advanced technology solar telescope

size D | scale: as noted
rev B

ATST DWG-00124

sht S4 11 of 30

Notes:
For door dimensions, finishes & ceiling heights - see schedules (sht. G1)
For stair sections - see sheet A13
For shaft sections - see sheet A14
54'-2" [16510]
82'-0" [24990]
20'-1½" [6134]
7'-0½" [2140]
52'-4" [15950]
26'-0" [7920]
28'-7" [8710]
19'-8" [5990]
2'-7"
1'-2"
19'-0" [5791]
8'-2" [2490] clear opng.
6'-8" [2030]
3'-0"
3'-8"
87'-2½" [26581]
vent louver
temporary storage of mirror wash rack?
effluent tank
recirc. water
liquid nitrogen N.I.C.
5 Multi-use Shop Area or Coating Facility
Receiving & Staging Area
12 Lower Enclosure (ground)
13 Outer Pier Interior (ground)
prep & wash
fan
coating chamber
controls
Potential Future Coating Facility (and related equip) N.I.C.
UP
M1 mirror
4 Receiving Area
M1 on cart
6 Platform Lift (22-ton)
10 Vestibule
11
fume hood
14 Inner Pier Interior
air transfer grilles in doors and in walls (if needed)
coudé platform cable wrap (N.I.C.)
mechanical space
storage space
1 vest.
2 corridor
elevator (3500 lbs.) 7
elev. mach. room 8
vac. pump N.I.C.
electrical
utility chase
utilities hatch
3
UP
sink
custodial equipment & supplies
utility lines above at ceiling
floor drain
9 Mechanical Equipment Room
oil tank N.I.C.
hydostatic oil pump N.I.C.
utilities
poured-in-place concrete walls of telescope pier
air handling units for coudé lab HVAC (N.I.C.)
openings for ducts coordiante with coudé HVAC design
utility shaft above
3"rigid insulation full height on pier w/ reflective outer surface
foundation isolation joint
precast concrete wall panels
enclosure foundation below
Exist. Mees Bldg.
up
wastewater treatment plant (u.g.)
concrete apron
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27
5,319 sq.ft. ops. bldg.
1,648 sq.ft. enclosure
3,566 sq.ft. pier
Ground Level - Gross Floor Areas
north
0 5 10 20 ft.
0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory
SUPPORT & OPERATIONS BUILDING
GROUND LEVEL FLOOR PLAN

ATST advanced technology solar telescope

size D
rev B
scale: 1"= 5'
ATST DWG-00124

Notes:

For door dimensions, finishes & ceiling heights - see schedules (sht. G1)

For stair sections - see sheet A13

For shaft sections - see sheet A14

ladder and steel grate landings

M16 door and interior landing deleted - verify not required for egress

4040 4040 4040 4040 4040

3 Floor space here (880 sq.ft.) to be included as an Additive Alternate to the construction contract.

- Entry door
- Extra floor carrying capacity in columns,
- Electrical feed,
- Provision for network connection

all included in Base Bid

28 Pier

entire floor structure between outer and inner pier walls is N.I.C.

4 open to below

M12 UP DN 11

M11

suspended structure of sub-floor instrument platform and connection to utilites below (N.I.C.)

access to underside of coudé platform & sub-floor instrument station

6 Platform Lift (22-tons)

M13

26 vestibule

M18

M10

M17

27 Lower Enclosure

make-up air units and ductwork for coudé HVAC (N.I.C.)

2040

M 21

M4 W 22

20a stor.

M3

elev. 7

M14

M2

workstations

3040

3 UP DN

M1

20 Corridor

25 Open Office

AHUs for coudé HVAC (N.I.C.)

M5 M6 M7

break area

23 Office

24 Office/Conf.Rm.

M8 util. 25a

M9

8040 window

M15

utility chase

27

Access Balcony

4040 4040 4040 4040

shelf or enclosure for network switch node

ladder and steel grate landings (typ)

880 sq.ft. Add Alternate expansion

570 sq.ft. enclosure (sum of 3 areas)

2,212 sq.ft. ops bldg.

3,566 sq.ft. pier (floor N.I.C.)

Mezzanine Level - Gross Floor Areas

north

0 5 10 20 ft.

0 5 m

Exist. Mees Bldg.

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

SUPPORT & OPERATIONS BUILDING
MEZZANINE LEVEL FLOOR PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 5'
rev B
ATST DWG-00124
sht A2 13 of 30

Notes:

For door dimensions, finishes & ceiling heights - see schedules (sht. G1)

For stair sections - see sheet A13

For shaft sections - see sheet A14

roof over building below

36 Lower Enclosure

C17

C12

UP

DN

non-rotating zone

rotating

37 Coudé Platform

C11

11

entire rotating & fixed coudé floor structure inside pier is N.I.C.

C18

C19

35 vestibule

5 m

max. defined instrument size

2.4 m

C14

C13

6 Platform Lift

5 ton bridge crane

32 Instrument Prep Lab

future light feed

crane coverage

area

gowning

closure to sloping walls of pier (typ) w/ vibration isolation seal

removable access floor panels (N.I.C.)

sink

C3

C10

WC

31

C2

part storage or other use

elev.

7

C15

8040 window

34 Control Room

continuous floor grate

3

C1

DN

30 Corridor

C6

C4

C5

C7

tapering concrete pier

base of pier at coudé floor

coudé HVAC ducts (N.I.C)

C8

33 Computer Room

utility chase

ladder

provide vibration isolated structural mounts for ducts

C16

utilities

8040 window

C9

Access Balcony

Exist. Mees Bldg.

1,565 sq.ft. enclosure

3,556 sq.ft. ops. bldg.

3,566 sq.ft. pier (floor N.I.C.)

Coudé Level - Gross Floor Areas

north

0 5 10 20 ft.

0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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Support Facilities at Haleakalā Observatory

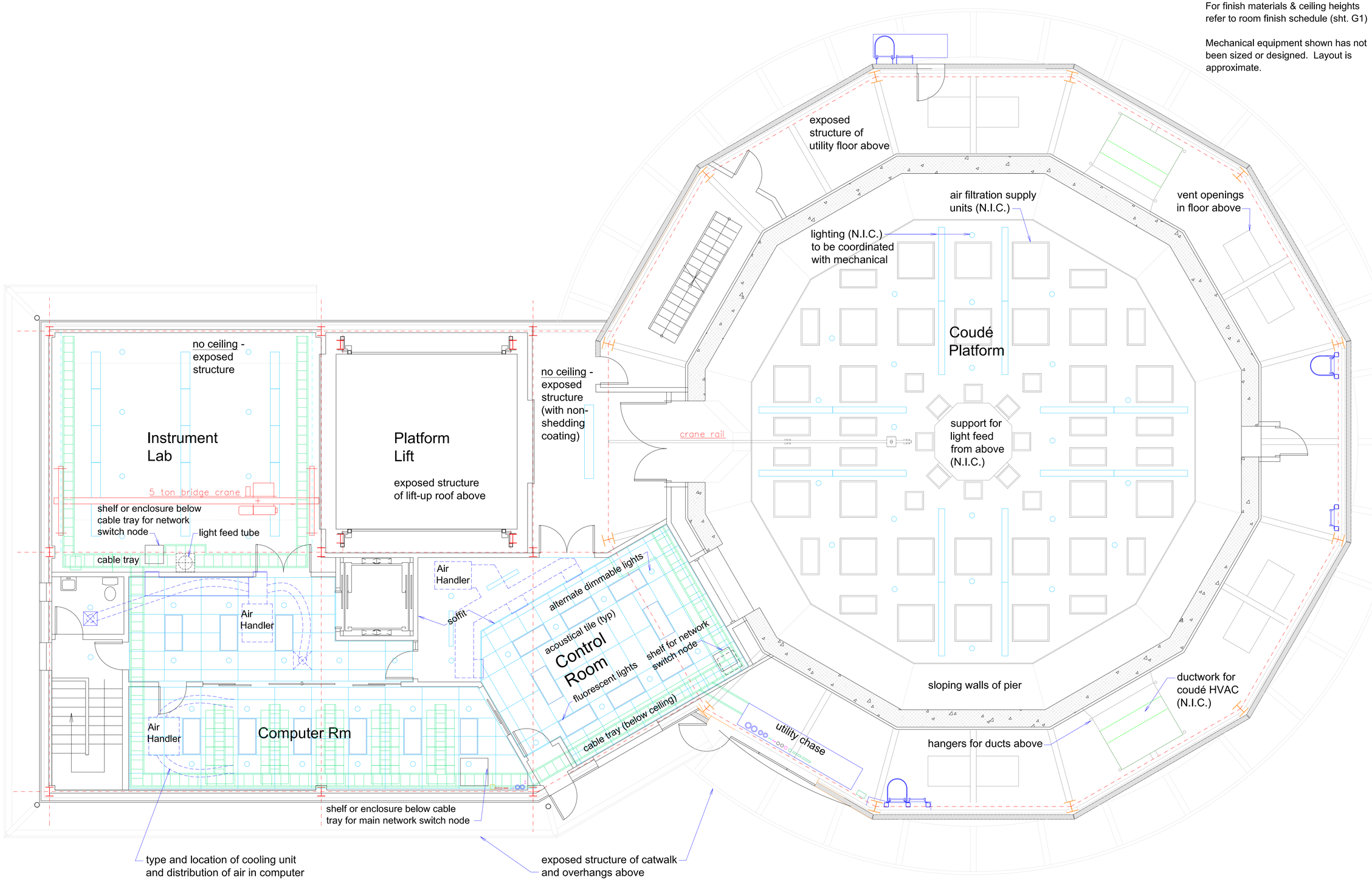
SUPPORT & OPERATIONS BUILDING
COUDÉ LEVEL FLOOR PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 5'
rev B
ATST DWG-00124
sht A3 14 of 30

Notes:
For finish materials & ceiling heights refer to room finish schedule (sht. G1)

Mechanical equipment shown has not been sized or designed. Layout is approximate.



north

0 5 10 20 ft.

0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Support Facilities at Haleakalā Observatory

SUPPORT & OPERATIONS BUILDING
COUDÉ REFLECTED CEILING PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 5'
rev B
ATST DWG-00124
sht A4 15 of 30

Notes:

FFE 50'-10 1/4" above ground floor

For doors & finshes - see schedules (sheet G1)
For stair sections - see sheet A13
For shaft sections - see sheet A14

gutters & downspouts to rainwater tank

outside face of building below

standing seam metal roofing
7° (1 1/2 in 12) slope)

hip flashing

30'-10"
[9410]

26'-4"
[8030]

antennas
and weather
station
(location TBD)

future
coelostat

8'-11"
[2720]

19'-8"
[5994]

19'-0"
[5791]

6 Platform Lift
(22-ton)

elev
7

40 vestibule
(unconditioned)

roof below

Exist. Mees Bldg.

ladder

U10

U8

roll-up vent doors
(5 locations)

U9

11

DN

U13

UP

U11

42

LU/LA
lift
43

U12

enclosure cable
wrap above

primary
structure
under floor
(typ)

44 Pier
(utility)

staging
area

U14

cable
wrap
(N.I.C.)

floor
structure
(N.I.C.)

U7

U4

U2

U3

U1

columns to
support floor
above

floor
structure
cantilevered
off of
enclosure

floor
supported
from pier

tapering concrete pier

isolation joint &
linear floor drain

41 Lower Enclosure
(utility)

U5

utility chase

floor vent grilles

elect. cabinets

U6

balcony below

catwalk above

3,810 sq.ft.
enclosure

1,595 sq.ft.
pier
(floor N.I.C.)

1,086 sq.ft.
ops. bldg.

Utility Level - Gross Floor Areas

north

0 5 10 20 ft.

0 5 m

drawn:	Jeff Barr
checked:	M. Warner
approved:	J. Wagner
	August 20, 2009

SCHEMATIC
DESIGN
DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

SUPPORT & OPERATIONS BUILDING
UTILITY LEVEL FLOOR PLAN

ATST
advanced technology solar telescope

size D	scale: 1"= 5'
rev B	

ATST
DWG-00124

sht A5 16 of 30

Notes:

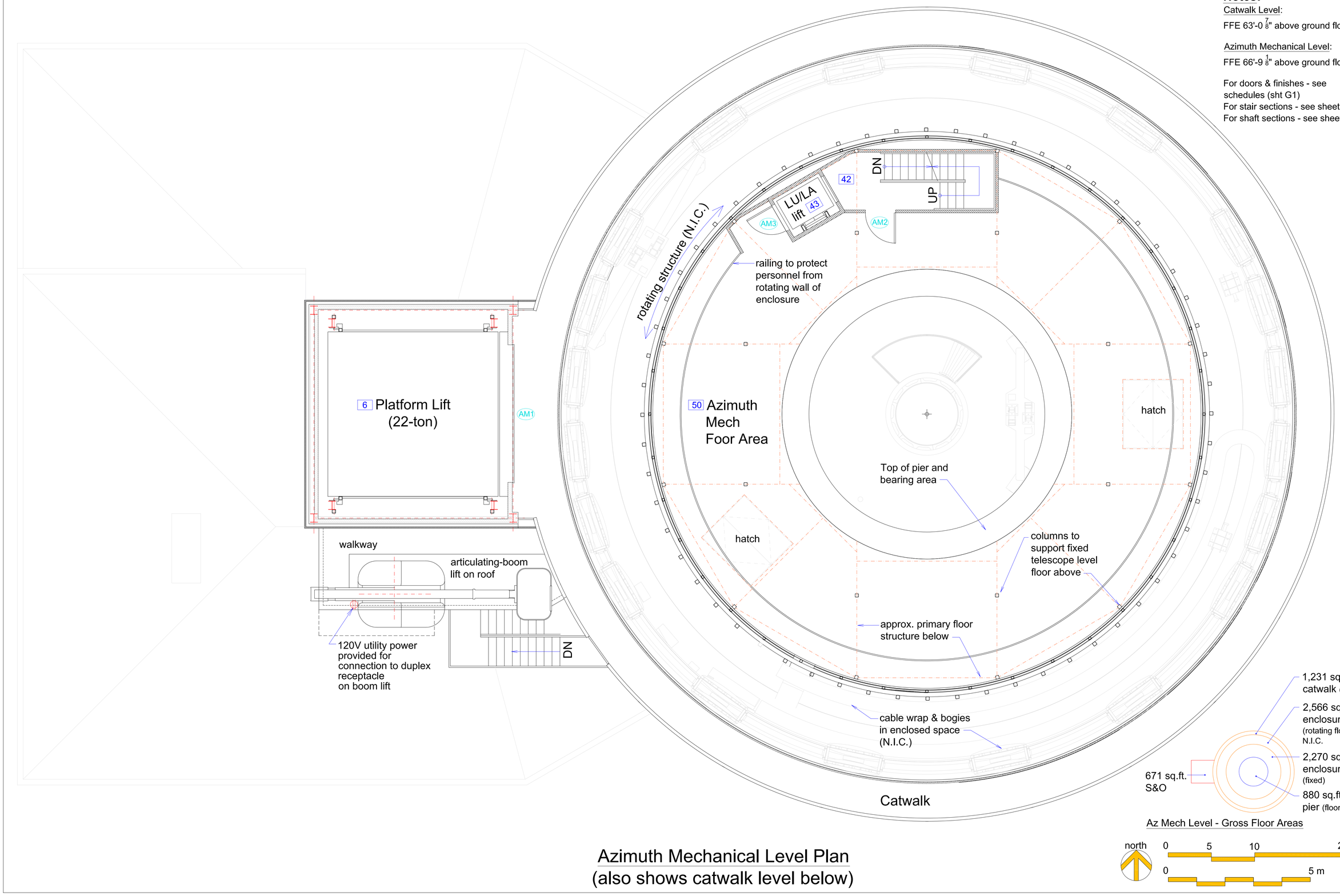
Catwalk Level:

FFE 63'-0 7/8" above ground floor

Azimuth Mechanical Level:

FFE 66'-9 1/8" above ground floor

For doors & finishes - see schedules (sht G1)
For stair sections - see sheet A13
For shaft sections - see sheet A14



Azimuth Mechanical Level Plan
(also shows catwalk level below)

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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Support Facilities at Haleakalā Observatory

SUPPORT & OPERATIONS BUILDING
AZIMUTH MECH. FLOOR PLAN

ATST advanced technology solar telescope

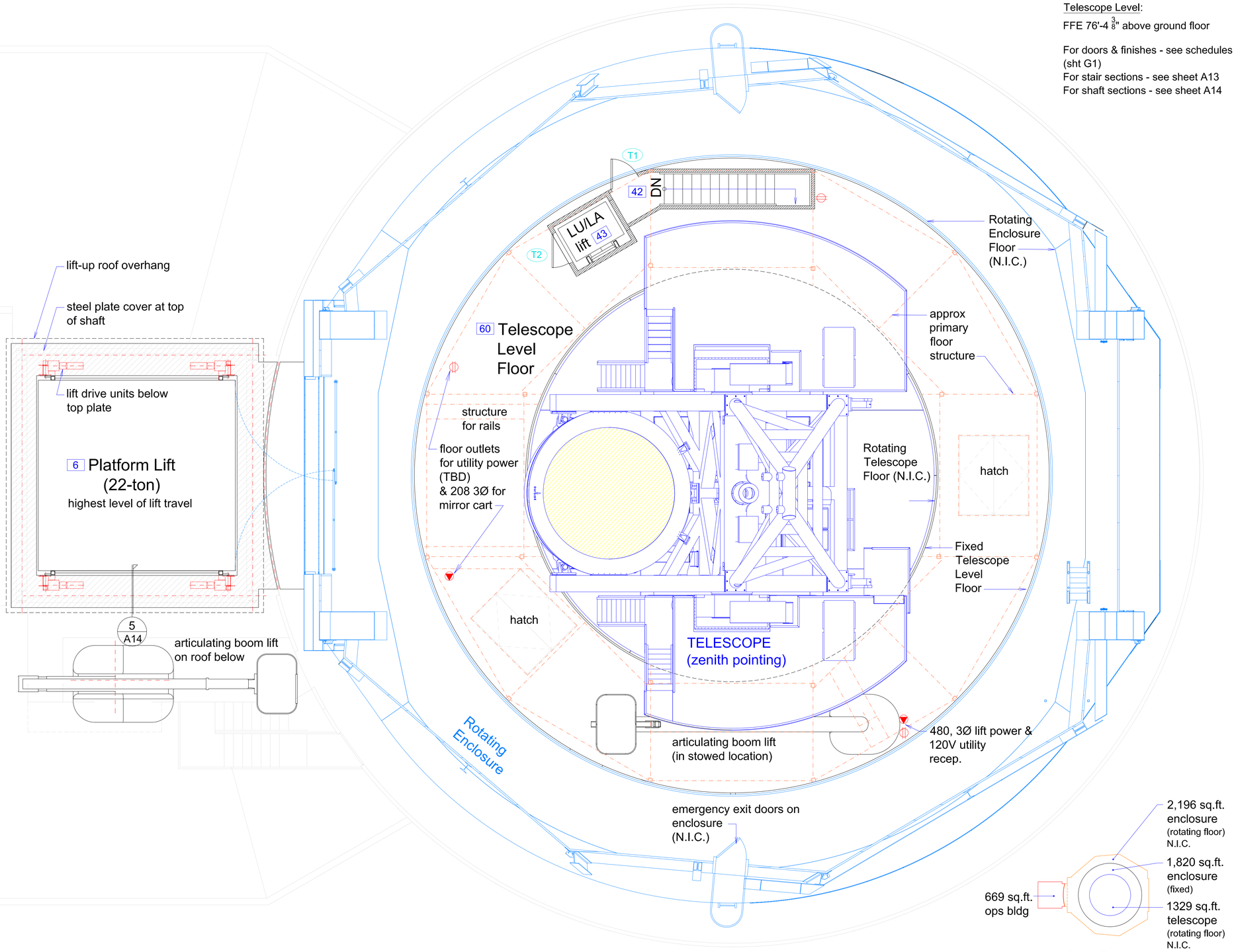
size D | scale: 1"= 5'
rev B
ATST DWG-00124
sht A6 17 of 30

Notes:

Telescope Level:

FFE 76'-4 3/8" above ground floor

For doors & finishes - see schedules (sht G1)
For stair sections - see sheet A13
For shaft sections - see sheet A14



Az Mech Level Gross Floor Areas

north

0 5 10 20 ft.

0 5 m

Telescope Level Plan

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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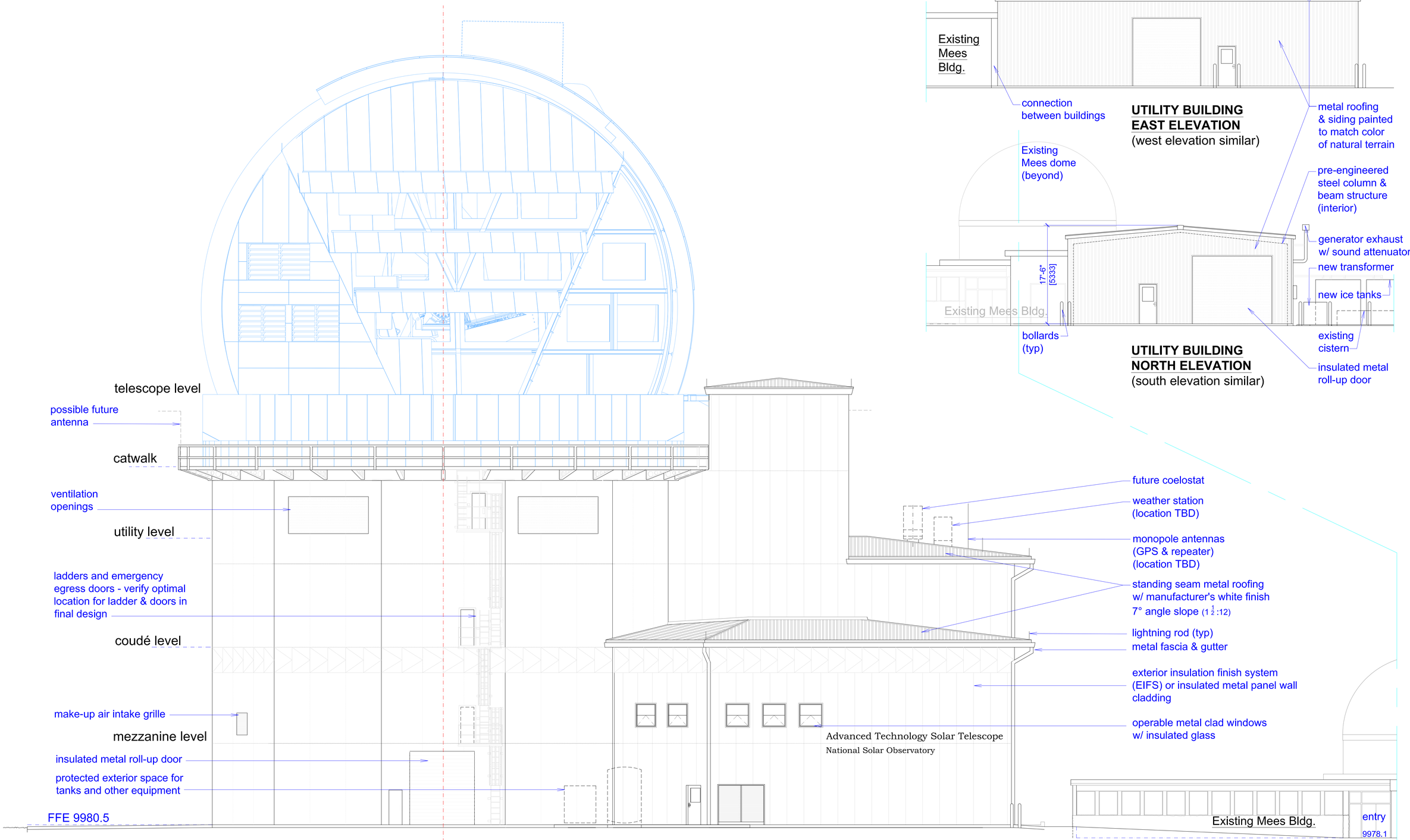
Support Facilities at Haleakalā Observatory

SUPPORT & OPERATIONS BUILDING
TELESCOPE LEVEL FLOOR PLAN

size D | scale: 1"= 5'
rev B
ATST DWG-00124
sht A7 18 of 30



NORTH ELEVATION of S&O BUILDING

0 5 10 20 ft.
0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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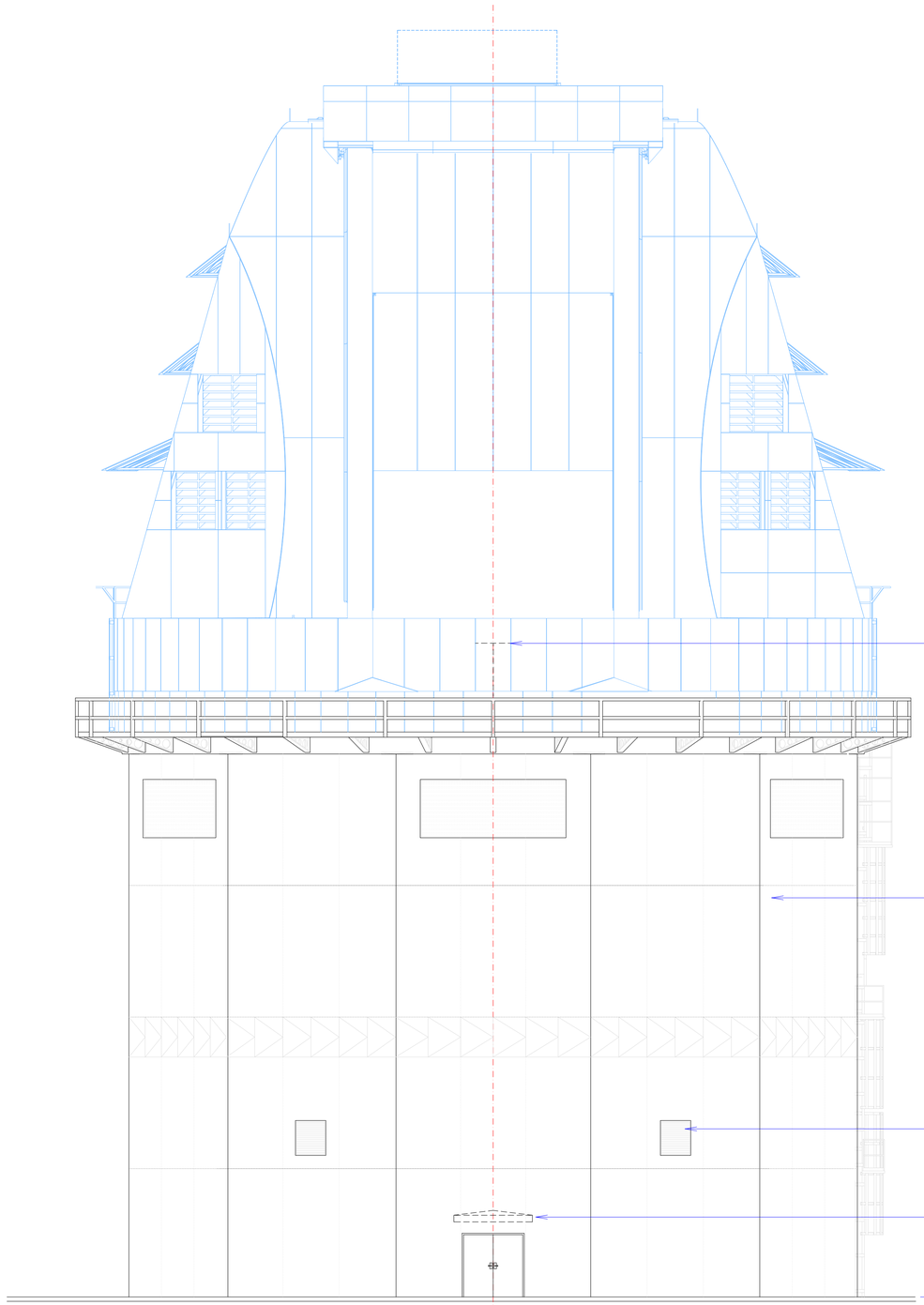
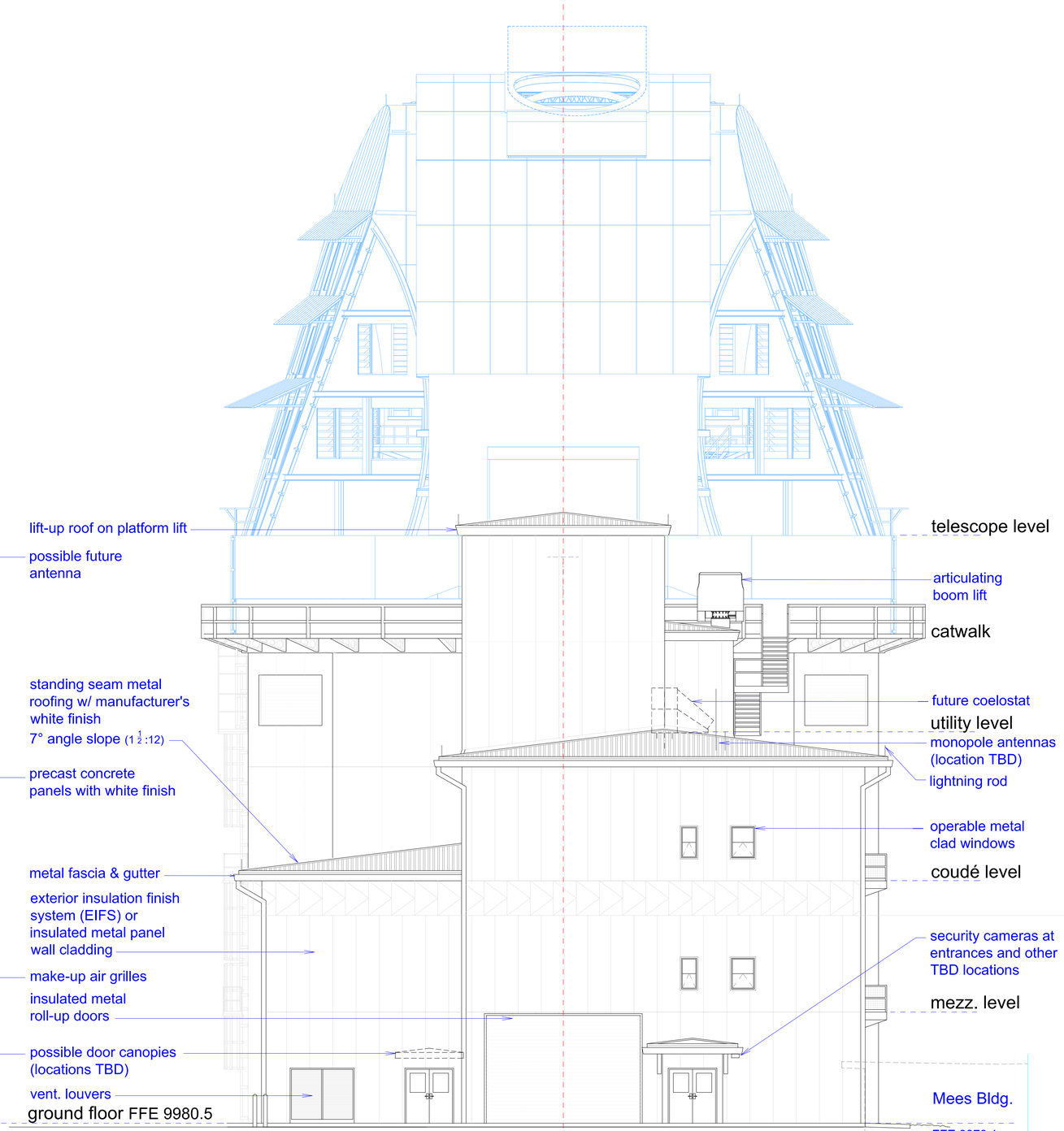
Support Facilities at Haleakalā Observatory

S&O BUILDING NORTH ELEVATION
UTILTIY BUILDING ELEVATIONS

size D
rev B
scale: 1/8"=1'-0"
ATST DWG-00124
sht A8 19 of 30





EAST ELEVATION of ENCLOSURE

WEST ELEVATION of S&O BUILDING

0 5 10 20 ft.
0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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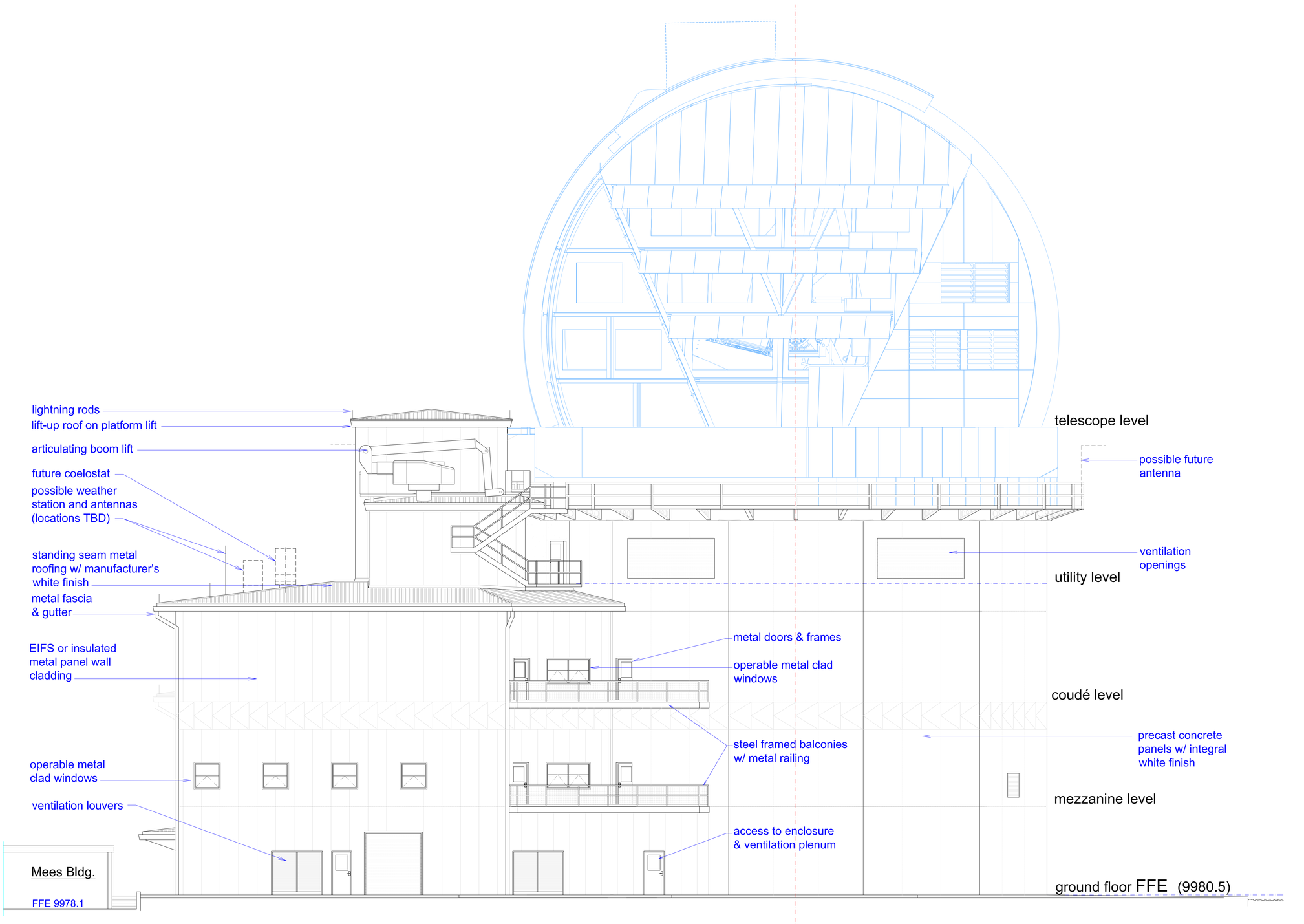
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

EAST & WEST ELEVATIONS

ATST advanced technology solar telescope

size D | scale: 1/8"=1'-0"
rev B
ATST DWG-00124
sht A9 20 of 30



SOUTH ELEVATION of S&O BUILDING

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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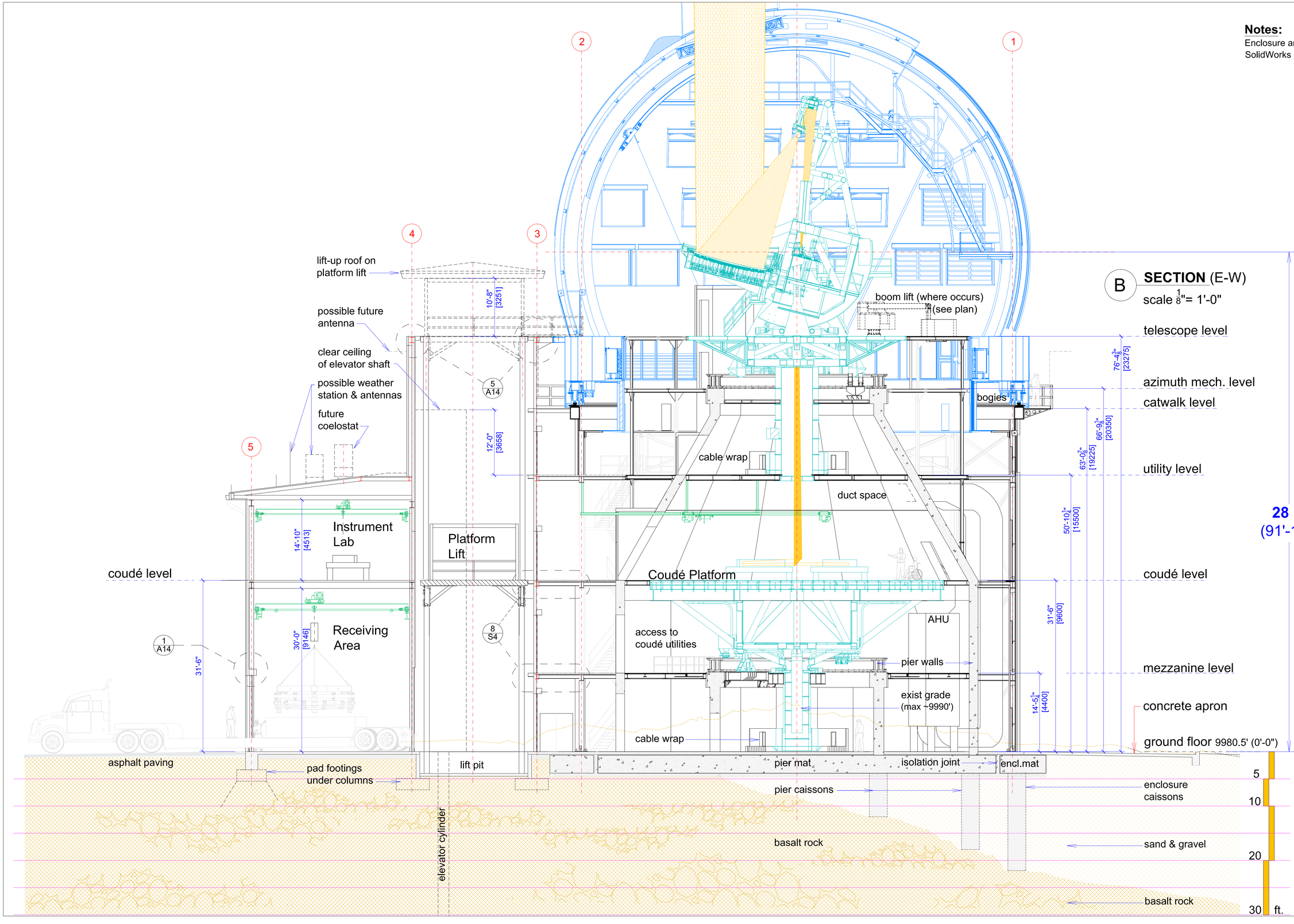
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

SOUTH ELEVATION

size D
rev B
scale: 1/8"=1'-0"
ATST DWG-00124
sht A10 21 of 30

Notes:
Enclosure and TMA from
SolidWorks model July 2009



B **SECTION** (E-W)
scale $\frac{1}{8}$"= 1'-0"

drawn:	Jeff Barr
checked:	M. Warner
approved:	J. Wagner
	August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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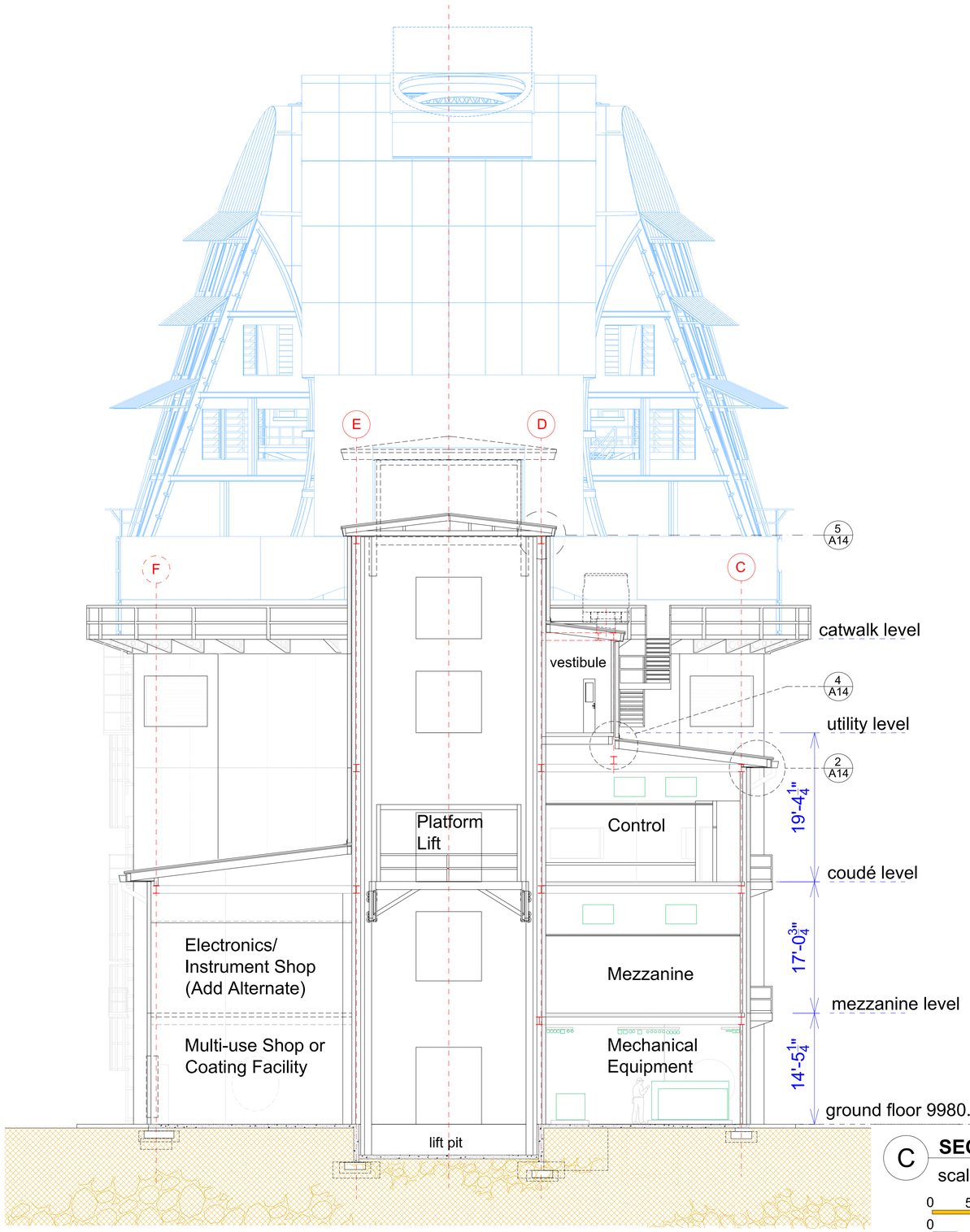
Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

S&O BUILDING, ENCLOSURE &PIER
SECTION (E-W)

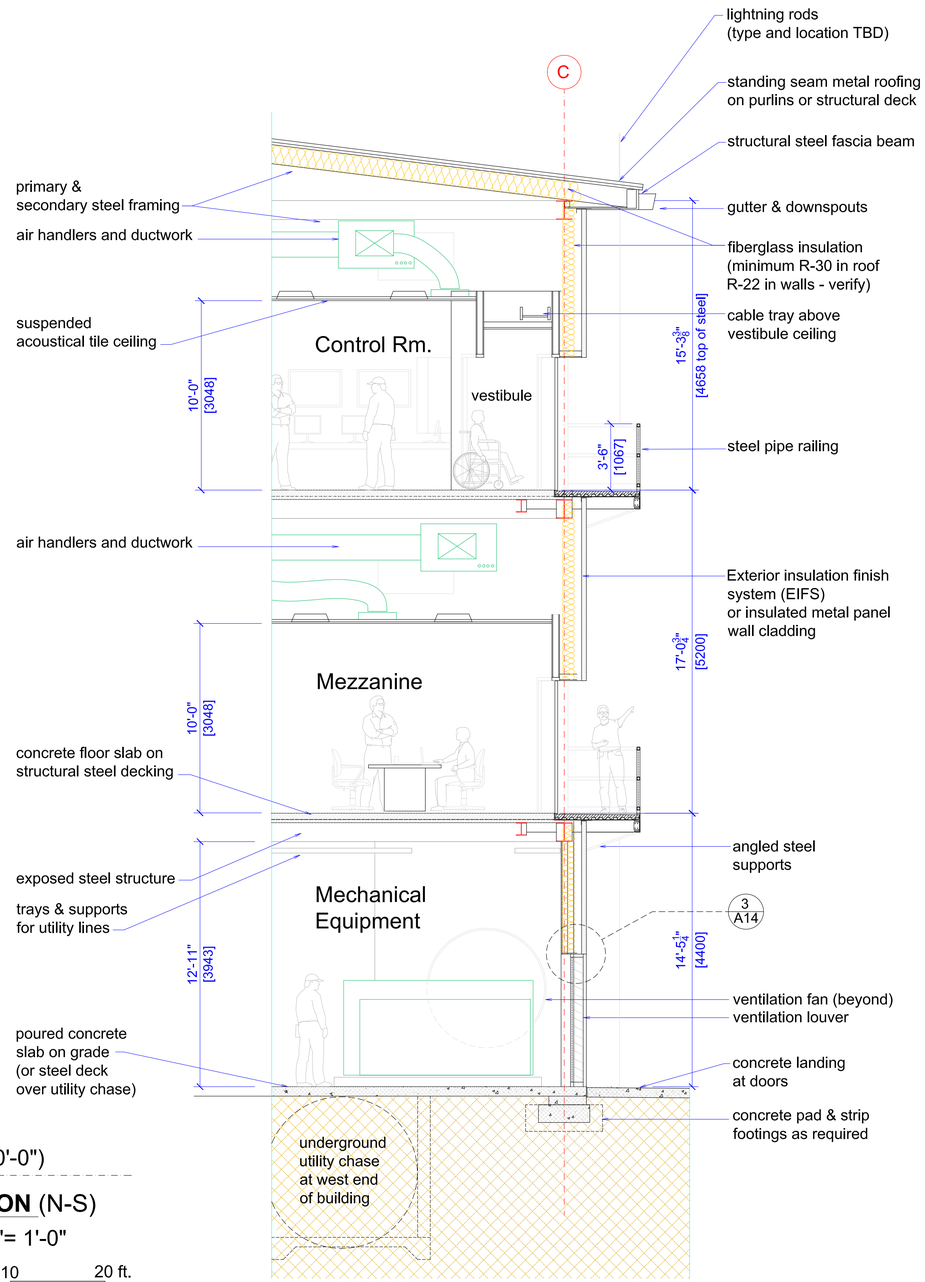
ATST advanced technology solar telescope

size D	scale: $\frac{1}{8}$"=1'-0"
rev B	
ATST DWG-00124	
sht A11	22 of 30



C **SECTION** (N-S)
scale 1/8"= 1'-0"

0 5 10 20 ft.
0 5 m



EXTERIOR WALL SECTION
scale 1/4"= 1'-0"

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC
DESIGN
DRAWINGS

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Support Facilities at Haleakalā Observatory

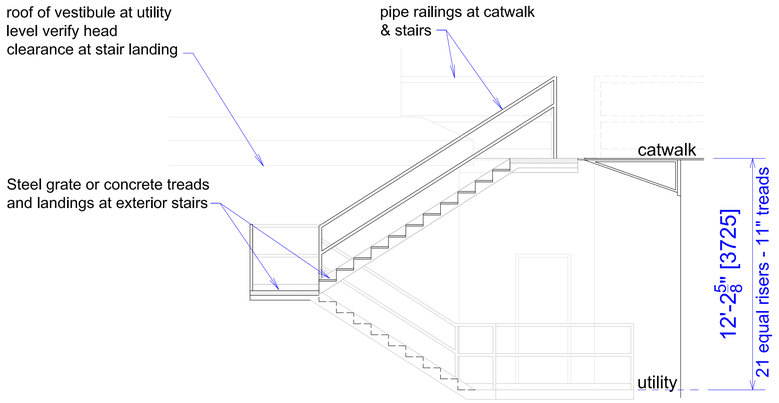
S&O BUILDING SECTION (N-S)
& WALL SECTION

ATST
advanced technology solar telescope

size D | scale: as noted
rev B

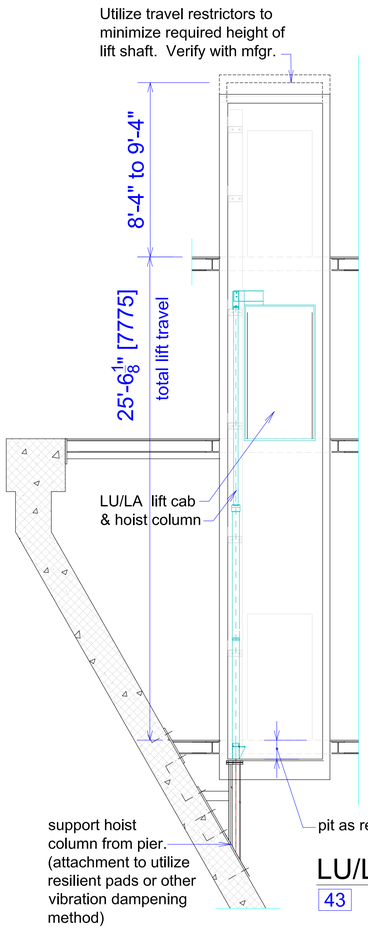
ATST
DWG-00124

sht A12 23 of 30



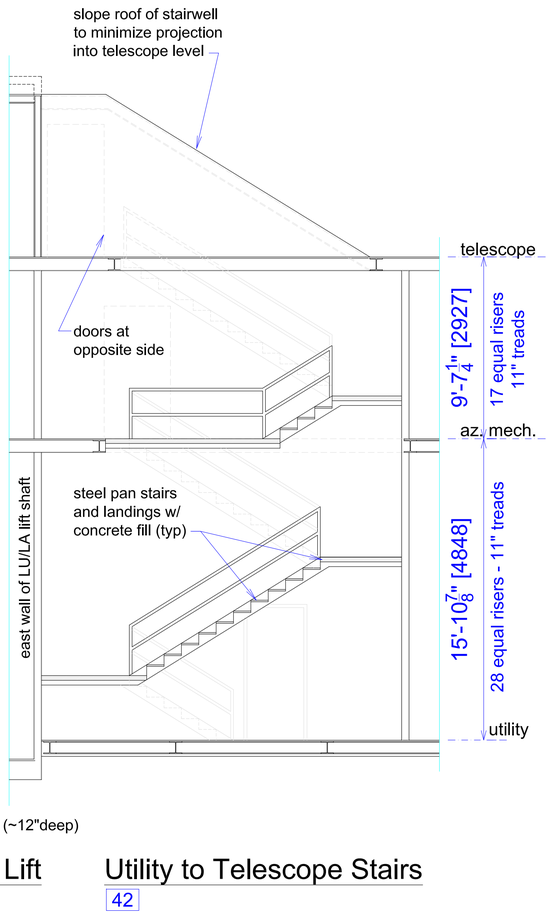
Utility to Catwalk Stairs

Note:
Design and installation of Limited-Use Limited-Application (LULA) lift device shall comply with all applicable regulations of the State of Hawai'i Elevator Inspection Branch



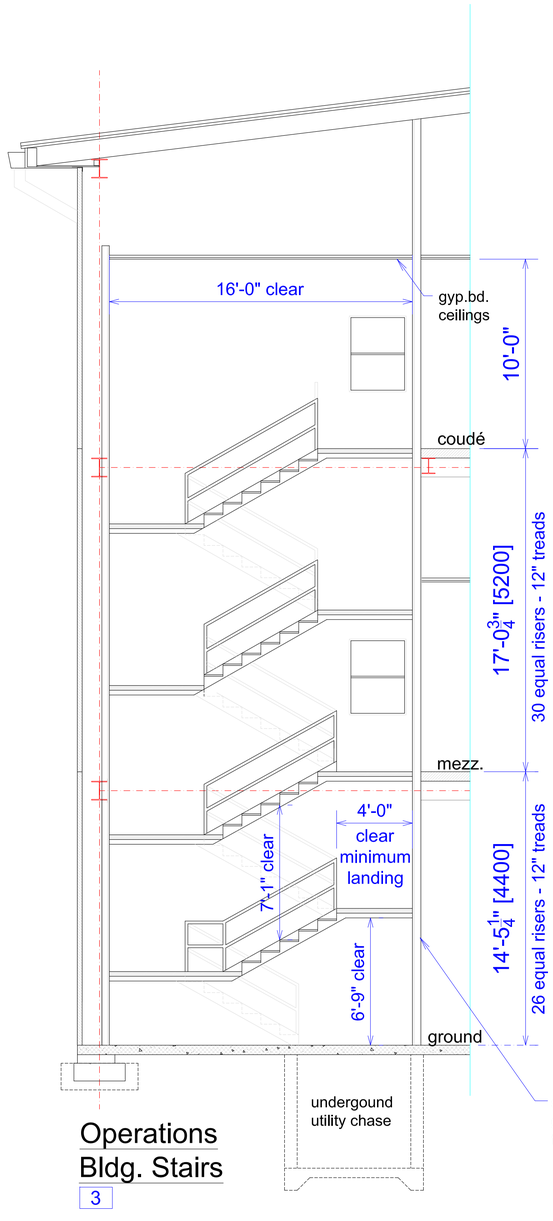
LU/LA Lift

43



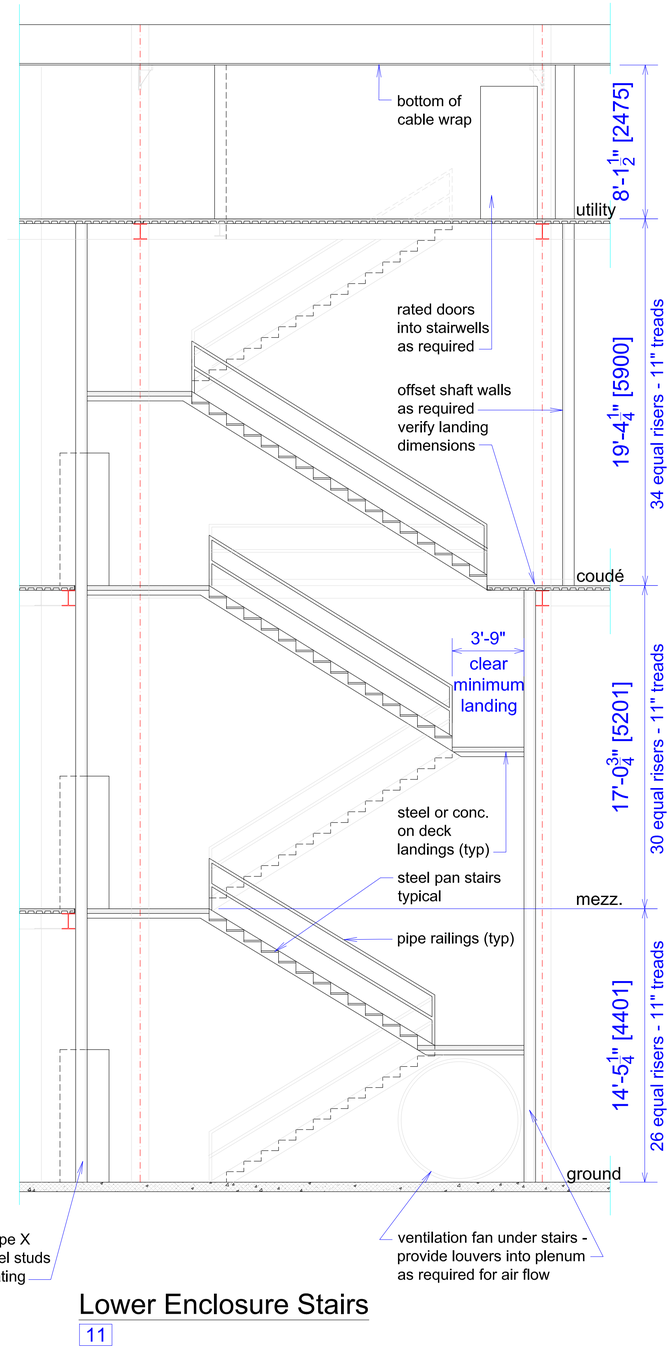
Utility to Telescope Stairs

42



Operations Bldg. Stairs

3



Lower Enclosure Stairs

11

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

NATIONAL SOLAR OBSERVATORY
operated by the
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NATIONAL SCIENCE FOUNDATION

Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

STAIRS & LU/LA LIFT SECTIONS

size D | scale: 1/4"= 1'-0"
rev B
ATST DWG-00124
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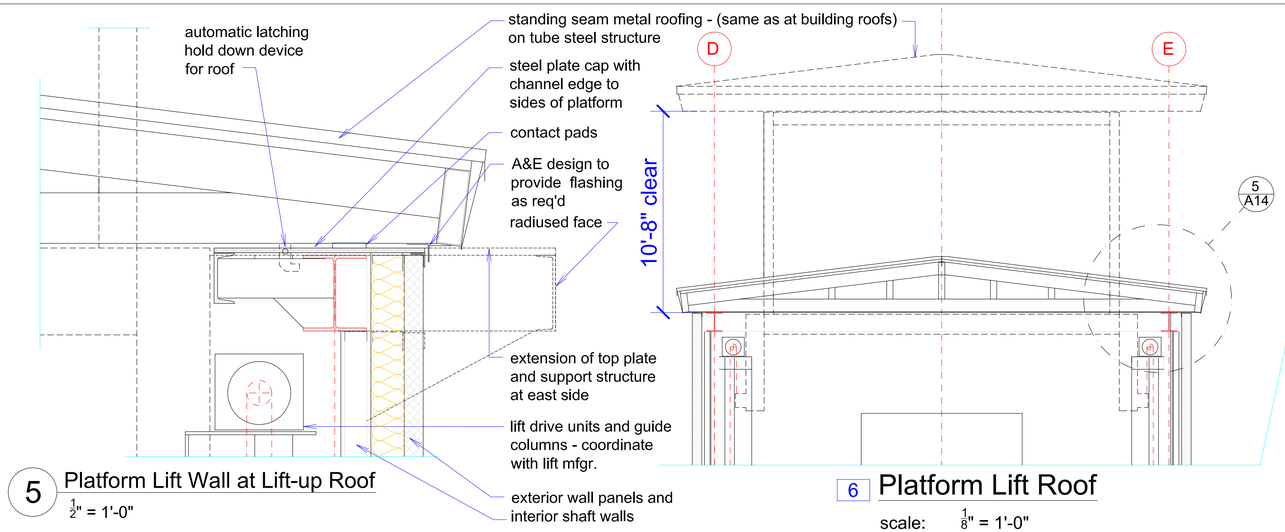
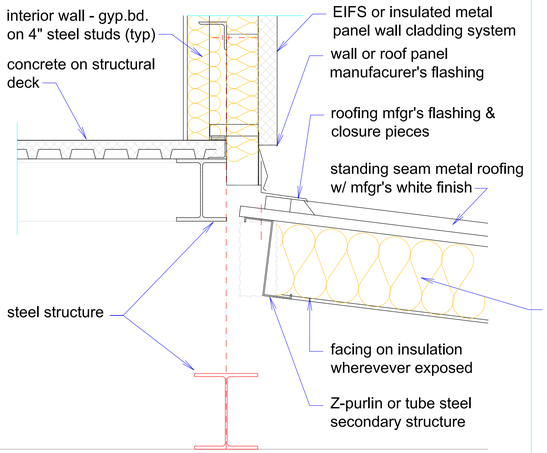


5 Platform Lift Wall at Lift-up Roof

$\frac{1}{2}$" = 1'-0"

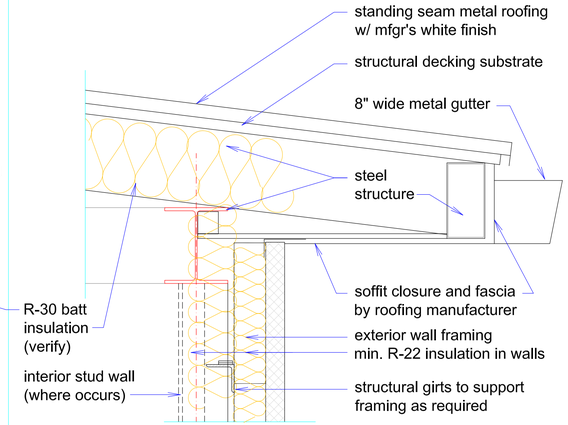
6 Platform Lift Roof

scale: $\frac{1}{8}$" = 1'-0"



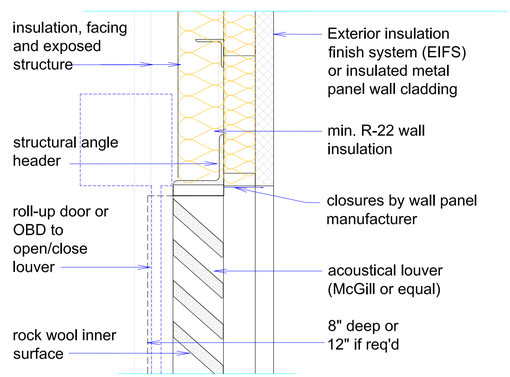
4 Exterior Wall (at utility level) to Roof Flashing

$\frac{1}{2}$" = 1'-0"



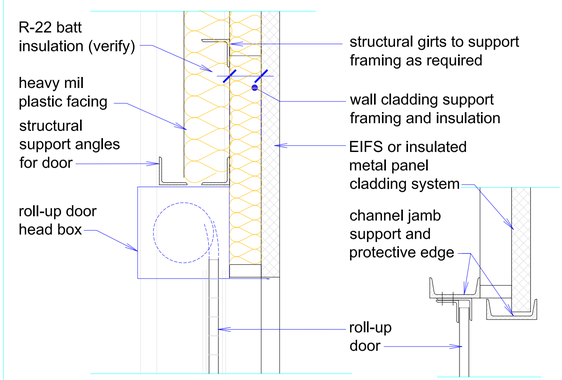
2 Typical Roof Overhang

$\frac{1}{2}$" = 1'-0"



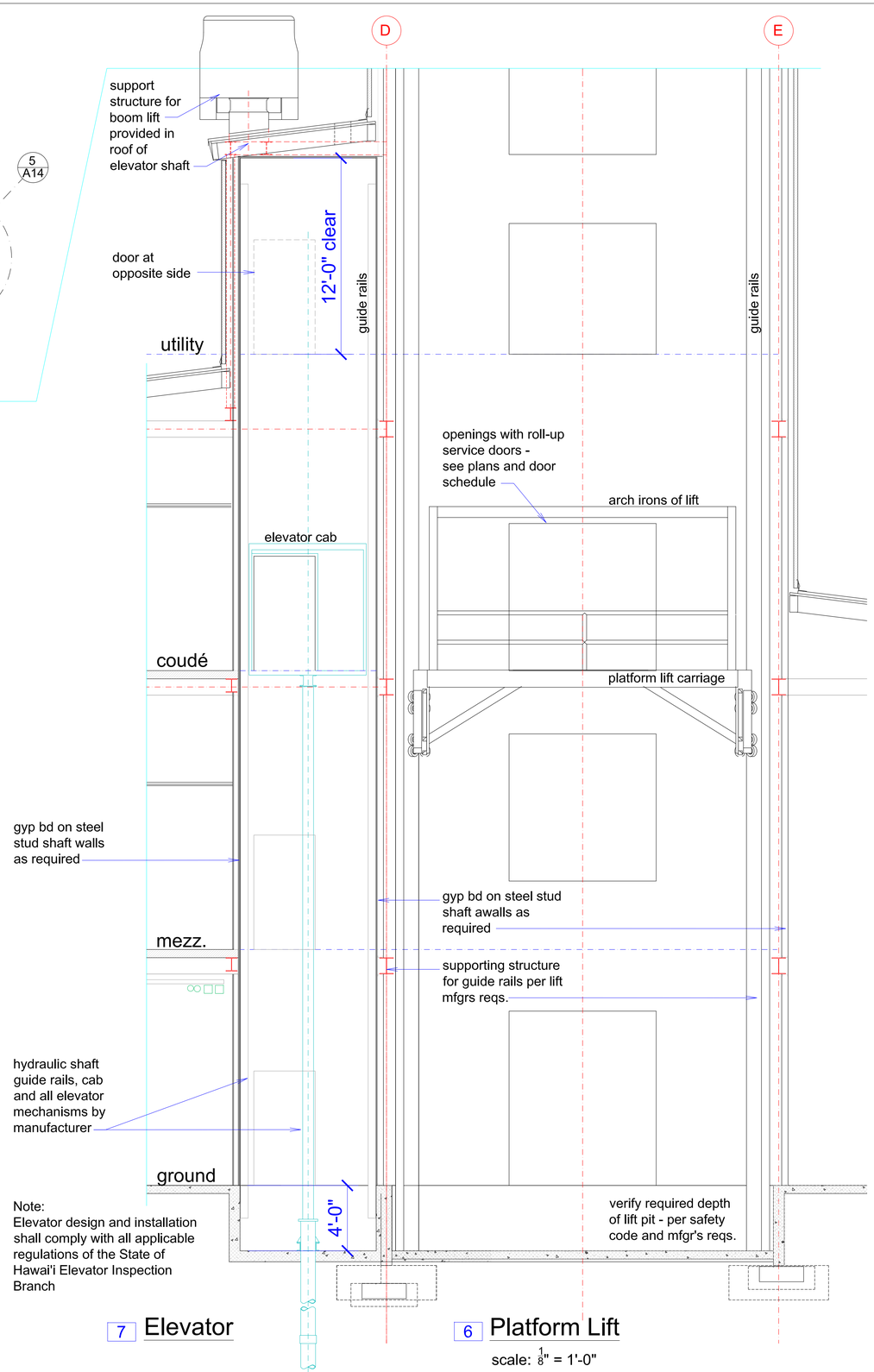
3 Typical Exterior Vent Louver

$\frac{1}{2}$" = 1'-0"



1 Typical Wall Detail & Roll-up Door Head

$\frac{1}{2}$" = 1'-0"



Note:
Elevator design and installation shall comply with all applicable regulations of the State of Hawai'i Elevator Inspection Branch

7 Elevator

6 Platform Lift

scale: $\frac{1}{8}$" = 1'-0"

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

ELEVATOR & PLATFORM LIFT SECTIONS
ARCHITECTURAL DETAILS

size D | scale as noted
rev B

ATST
DWG-00124

sht A14 25 of 30

main road

telephone & fiber lines

new MECO electrical feed (~960 kVA)

New Ice Storage Tanks
3-ganged, 1572 gals ea.

Existing Cistern
(64,100 gal capacity)
& new underground tanks
(~40,000 gal. total)
(here or at other location)
utilize for Mees &
ATST water service

plate & frame
heat exchangers

Heat Pump
condensing unit

Vane-axial fan
greenheck 7.5 h.p.
45,000 cfm
w/ sound trap

air compressor
w/ filter & dryer

Water pumping &
filtration equipment

Vehicular access from
west of the cistern

exist
diesel
fuel tank

40'-0"

UB2

UB1

16 Electrical
Utility Room

15 Mechanical
Utility Room

sound baffling louvers

floor drain

UB3

64'-0"

UB4

12' roll-up door

main utility lines
overhead on
racks hung
from steel
structure

exist
X-former

storage

new crane?

Expanded Shop N.I.C.
(870 sq.ft.)

UPS units

Diesel Generator
~300 KVA w/
auto-transfer switch

Main switchgear and
energy management system

telephone board &
fiber connection equip

motor control center

appropriate
separation
wall (TBD)

Air-cooled
Scroll
Chiller
80-ton,
low temp
(45° to 15°F)
(verify)

Chiller
15-ton,
very low temp
(20° to -10°F)
(verify)

Utility
Building

pumps &
glycol feed

pipes & conduits
down to
u.g. chase

connect buildings

remove exist.
generator &
walls N.I.C.

new columns
N.I.C.

underground utility chase

concrete or steel pipe
chase (or rectangular
precast sections)

1"Ø domestic water

3"Ø compressed air

2- 1"Ø copper -
refrigerant for heat pump

4- 6"Ø chilled water
2 sets of supply & return
for constant 7°C
& ambient - 15°C
insul steel or copper pipe

2- 8"Ø chilled water
(supply and return for
ambient - 4°C)
insul steel or copper pipe

8'-0"(I.D.)
[2438]

Utility
Chase

light fixtures

unistrut supports

3 - 4"x12" cable
ways for:
fiber, low voltage
control & spare

emerg stop system
w/ mushroom switch

space for future (typ)

6- 4" conduit -
main power feed
(480V, 3Ø)

3- 2" conduit -
UPS power feed
(208V 3Ø)

1 Section through Underground Chase
1/4" = 1'-0"

See SPEC-0063 *Interconnects & Services*

NOTE:
All sizes of pipes and conduits
indicated are to be verified

See ground level
interconnects & services
plan (sheet U1) for
continuation

Operations
Building
Ground Floor
(see sheet A1)

Existing Mees Bldg.

Lab/Electronics Shop

Lab

Dorm

north

0 5 10 20 ft.

0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC
DESIGN
DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

**UTILITY BUILDING &
PARTIAL MEES FACILITY PLAN**

ATST
advanced technology solar telescope

size D
rev B
scale: 1"= 5'

ATST
DWG-00124

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See: SPEC-0063
Interconnect and Services
for additional information regarding all piping, electrical lines, chases, openings through pier walls and other utility-related specifications

nitrogen supply
(tank N.I.C.)

Operations Building

480 V, 3Ø
disconnect &
junction box
provided for
shop/coating
facility -
location(s) TBD

Staging &
Receiving Area

overhead utility lines to receiving & coating TBD

provide
power
for crane &
platform lift
as required

Platform
Lift

Lower Enclosure

480 V, 3Ø and UPS power
disconnects & junction boxes
for future coating facility -
locations TBD

480 V, 3Ø or 208, 3Ø
as required for coudé
HVAC air handling units

Base of
Telescope
Pier

underground
chase to
Utility Building
see sheet A15
for continuation

vacuum
pump

480 V, 3Ø and 208, 3Ø
as required for
mechanical equipment.
Power bars throughout

electrical switchgear

utility lines in to coudé
rotator cable wrap TBD
(similar to lines to
telescope wrap
shown on sheet U3)

20A utility power outlets
on pier - number locations,
and cicuiting TBD)

utilities to AHUs TBD

chase up to
mezzanine
& coudé

hydrostatic oil
pump & tank

ladder from ground level
up to utility level

pipes & conduits up from underground chase -
see SPEC-0063 for transition

main utility lines overhead on
racks hung from steel structure

Note: Comply with all applicable
State of Hawai'i regulations regarding
mechanical equipment installation,
operation and maintenance

all utility runs overhead
unless noted otherwise

utility chase up to enclosure and telescope
(see detail 1 on sheet U2)
Electrical runs include 480V 3Ø to upper
floors - (mezzanine, coudé, utility,
az mechanical, telescope & enclosure

Notes:

This plan shows primary utility lines for telescope, enclosure, instruments and major systems. Other ancillary and secondary lines are TBD

Electrical power distribution shows only main items and other service requirements as determined for schematic design. Other requirements are TBD

north

0 5 10 20 ft.

0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

GROUND LEVEL INTERCONNECTS & SERVICES PLAN

ATST
advanced technology solar telescope

size D | scale: 1"= 5'
rev B

ATST
DWG-00124

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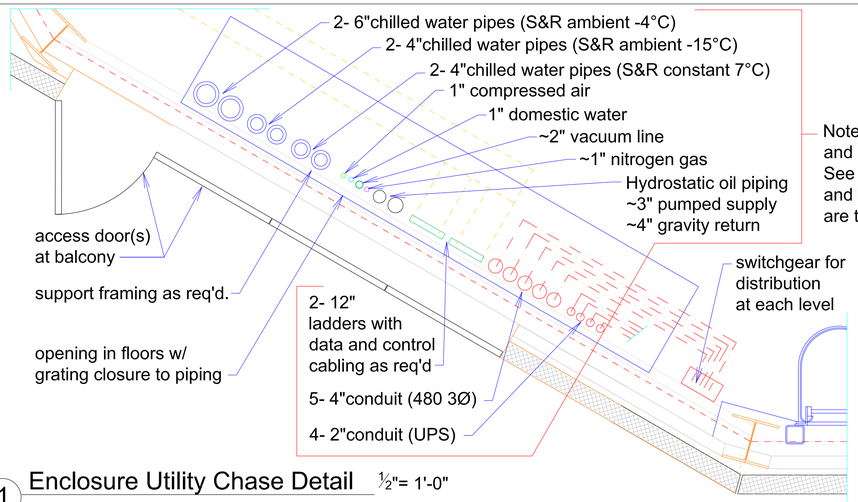

Note: arrangement and specification of piping and conduits is approximate.
See SPEC-0063 for further, updated information and for extent of utilities that are to be included in A&E design

1 Enclosure Utility Chase Detail ½"= 1'-0"

See: SPEC-0063
Interconnect and Services
for additional information regarding all piping, electrical lines, chases, openings through pier walls and other utility-related specifications

Utility and UPS power for Add Alternate mezzanine expansion below

Instrument Prep Lab

provide power for crane as required

data and control cabling

chilled water, tap water, air and cryogens as req'd

4

Platform Lift

all utility lines above ceiling

refrigerant lines to AHUs in ceiling

Control Room

1

data, control and orther low voltage cabling in tray above console

Computer Room

3

chilled water below floor to in-room cooling units

electrical distribution as required

utility chase up from below

Rotating Coudé Platform

all utilities to platform are from cable wrap below (N.I.C.)

Normal utility power duplex outlets around pier.
- exterior only at coudé level
- exterior and interior at mezzanine level below

At mezanine level, also provide two 30A, 208V, 3Ø twist lock receptacles

Enclosure Utility Chase (see detail 1 above)

all utility runs overhead unless noted otherwise

Notes:

This plan shows primary utility lines for telescope, enclosure, instruments and major systems. Other ancillary and secondary lines are TBD

Electrical power distribution shows only main items and other service requirements as determined for schematic design. Other requirements are TBD

1. Utility power 120V, and UPS 120V receptacles to be distributed throughout, with spacing and circuiting TBD based on use of the space. (This note also applies to office areas on mezzanine level below.)
2. Other areas to be provided with utility power 120V and other special purpose outlets as required.
3. Computer room to be provided with six 30A, 120V UPS circuits (one per bay of racks and one for room).
4. Instrument lab provided with two 120V utility power 120V UPS power, and at least one 208 3Ø receptacle, locations TBD based on use of the space.

north

0 5 10 20 ft.

0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

COUDÉ LEVEL INTERCONNECTS & SERVICES PLAN

ATST advanced technology solar telescope

size D
rev B
scale: 1"= 5'

ATST
DWG-00124

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See: SPEC-0063
Interconnect and Services
for additional information regarding all piping, electrical lines, chases, openings through pier walls and other utility-related specifications

6"Ø water collection piping from roof (typ.)

Platform Lift

Utility Level Floor

Cable Wrap

Utility power - 120V duplex receptacles locations TBD

Main utility services for enclosure up to cable wrap above. Termination by building contractor (Point of Connection) to be as defined in Enclosure to Buildings Interface control document

hydrostatic oil lines to bearings at Az Mech level below (N.I.C.)

208, 3Ø power, UPS or other power as required - at Utility, Az Mech. & Telscope levels

Main utility services for telescope to cable wrap. Termination by building contractor (Point of Connection) to be as defined in Telescope to Buildings Interface Control Document

enclosure control cabinets

utility chase - see detail 1 on sheet U2

all utility runs overhead unless noted otherwise

Notes:

This plan shows primary utility lines for telescope, enclosure, instruments and major systems. Other ancillary and secondary lines are TBD

Electrical power distribution shows only main items and other service requirements as determined for schematic design. Other requirements are TBD

north

0 5 10 20 ft.

0 5 m

drawn: Jeff Barr
checked: M. Warner
approved: J. Wagner
August 20, 2009

SCHEMATIC DESIGN DRAWINGS

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Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

UTILITY LEVEL INTERCONNECTS & SERVICES PLAN

ATST advanced technology solar telescope

size D | scale: 1"= 5'
rev B
ATST DWG-00124
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Room Finish & Equipment Schedule

No.	Space Description	ceiling height	ceiling material	walls	floor	Special Fixtures	Notes
1	vestibule	9'-0"	acous.tile	gyp.bd.	VCT		
2	corridor	9'-0"	acous.tile	gyp.bd.	VCT		
3	stairs - operations (3 levels)	~41'-6"	acous.tile	gyp.bd.*	vinyl		*multi layer for fire code as req.
4	receiving area	~30'-0"	exp. struct	gyp.bd.	conc.*	floor drain, crane	*epoxy painted
5	mirror coating	~30'-0"	exp. struct	exp. struct	conc.*	service sink, work counter, hoist	*epoxy painted
6	platform lift shaft (6 levels)	~80'-6"	exp. struct	gyp.bd.*	conc.	per manufacturer reqs.	*multi layer, (clg.ht. includes pit)
7	elevator (4 levels)	~67'-0"	gyp.bd.*	gyp.bd.*	conc.	per manufacturer reqs.	*multi layer, (clg.ht. includes pit)
8	elvator machine room	as req.	acous.tile	exp. struct	conc.	hydraulic pump and controls	
9	mechanical equip. room	~13'-0"	exp. struct.*	exp. struct.*	conc.	telescope & instrument services	
10	vestibule	~13'-6"	exp. struct	gyp.bd.	conc.*		*epoxy painted
11	stairs-enclosure (4 levels)	~58'-4"	gyp.bd.*	gyp.bd.*	mtl/conc		*multi layer for fire code as req.
12	lower enclosure (ground)		exp. struct	exp. struct	conc.		
13	outer pier interior		exp. struct	exp. struct	conc.		
14	inner pier interior		exp. struct	exp. struct	conc.		
15	mechanical utility room	~15'-0"	exp. struct.*	exp. struct.*	conc.	HVAC & Elect. As shown & reqd.	*sound treatment req. (TBD)
16	electrical utility room	~15'-0"	exp. struct.*	exp. struct.*	conc.	HVAC & Elect. As shown & reqd.	*sound treatment req. (TBD)
20	corridor	10'-0"	acous.tile	gyp.bd.	VCT		
20a	storage closet	9'-0"	gyp.bd.	gyp.bd.	VCT		
21	restroom (men)	9'-0"	gyp.bd.	cer.tile	cer.tile	H/C accessible fixtures	
22	restroom (women)	9'-0"	gyp.bd.	cer.tile	cer.tile	H/C accessible fixtures	
23	office	9'-0"	acous.tile	gyp.bd.	VCT		
24	office	9'-0"	acous.tile	gyp.bd.	VCT		
25	open office area	10'-0"	acous.tile	gyp.bd.	VCT	sink counter, cabinets	
25a	utility closet	9'-0"	gyp.bd.	gyp.bd.	VCT		
26	vestibule	15'-6"	exp. struct	gyp.bd.	conc.*		*epoxy painted
27	lower enclosure (mezzanine)		exp. struct	exp. struct	stl.grating		
28	pier						structure & finishes N.I.C.
30	corridor	10'-0"	acous.tile	gyp.bd.	VCT		
31	restroom (unisex)	9'-0"	gyp.bd.	cer.tile	cer.tile	H/C accessible fixtures	
32	instrument prep lab	~14'-10"	exp. struct	gyp.bd.	VCT*	crane, cable trays	*static dissipative
33	computer room	10'-0"	acous.tile	gyp.bd.	VCT*	cable trays	*static dissipative
34	control room	10'-0"	acous.tile	gyp.bd.	VCT	built-in consoles, cable trays	
35	vestibule	18'-0"	exp. struct*	gyp.bd.	conc.*		*epoxy painted
36	lower enclosure (coudé)		exp. struct	exp. struct	stl.grating		
37	pier (coudé platform)						structure & finishes N.I.C.
40	vestibule	11'-6"	exp. struct	gyp.bd.	conc.		
41	lower enclosure (utility)		exp. struct	exp. struct	stl.plate		
42	stairs - on pier (3 levels)	33'-4"	gyp.bd.*	gyp.bd.*	mtl/conc		*multi layer for fire code as req.
43	LU/LA lift shaft (3 levels)	34'-0"	gyp.bd.*	gyp.bd.*			*multi layer for fire code as req.
44	pier (utility)		exp. struct	exp. struct	conc.		structure & finishes N.I.C.
50	azimuth mechanical floor				stl.plate		teles. & enclosure structures N.I.C.
60	telescope floor				stl.plate		teles. & enclosure structures N.I.C.

Utility Interconnects & Services Requirements for Building Spaces

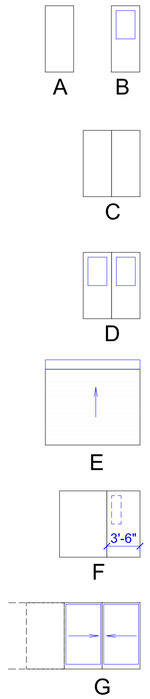
Space Description	lighting			elec. power				comm.				HVAC			plumbing						
Building Spaces	dimmable (TBD)	fluorescent	special	120V	208V, 3-phase	UPS	480V, 3-phase	other high voltage	telephone	ethernet	video	intercom	cooling (A/C)	heating	ventilation	special filt. (HEPA)	cold water-waste	hot water	chilled water	compressed air	cryogen (N & He)	other (TBD)
Control Room	X	X	X	X	X	X			X	X	X	X	X	X	X							
Computer Room		X		X	X	X			X	X		X	X	X	X							
Instrument Prep Lab	X	X	X	X	X	X			X	X	X	X	X	X	X	?	X	X	X	X	X	X
Offices (enclosed & open)		X		X		X			X	X		X	X	X	X							
Kitchen/Break Area	X	X		X					X	X		X	X	X	X		X	X				
Restrooms (3)	X			X					X	X		X	X	X	X		X	X				
Receiving/ Mirror Prep		X	?	X	X		X		X			X			X	?	X	X		X		X
Mirror Coating Area		X	?			X	X		X			X			X	?	X	X	X	X	X	X
Lower Enclosure Vestibules (4)		X		X											X							
Platform Lift Shaft		X			X		?								X							
Elevator Shaft		X			X		?		X				X	X	X							
Stairs (3)		X		X											X							
Mach. & Service Rms				X			X		X	X		X			X					?		
Mech. Equip. Space				X	X	X	X		X	X	X	X			X				X	X	?	
Pier (ground level)	X	X		X	X																	
Pier (mezzanine level)	X	X		X	X																	
Pier (coudé level)	X	X		X	X																	
Pier (utility level)	X	X		X	X	X																
Lower Enclosure (ground level)	X	X		X	X	X	X															
Lower Enclosure (mezzanine level)	X	X		X	X	X																
Lower Enclosure (coudé level)	X	X		X	X	X																
Lower Enclosure (utility level)	X	X		X	X	X																
Utility Building		X	?		X	X	X	X	X	X	X	X			X		X		X			

This schedule will be expanded and revised to coordinate with Interconnects and Services Specification (SPEC-0063)

Door Schedule for ATST Support Facilities

	No.	wd.	ht.	thk.	material	frame	type	label	details	hardware	comments
ground floor of S&O building	G1	6'-0"	7'-0"	1 3/4"	HM, insul	metal	D			ext., secur.	
	G2	6'-0"	7'-0"	1 3/4"	HM, insul	metal	D			passage	
	G3	3'-0"	7'-0"	1 3/4"	HM, insul	metal	B	1 hr		passage	
	G4	6'-0"	7'-0"	1 3/4"	HM	metal	C			privacy	
	G5	6'-0"	7'-0"	1 3/4"	HM	metal	C	?		security	
	G6	3'-0"	7'-0"	1 3/4"	HM, insul	metal	B			ext., secur.	
	G7	9'-0"	8'-0"	2"	mtl.,insul	stl.angle	E				
	G8	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			ext., secur.	
	G9	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			security	
	G10	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	G11	6'-0"	7'-0"	1 3/4"	HM, insul	metal	D			passage	w/ louvers?
	G12	6'-0"	7'-0"	1 3/4"	HM, insul	metal	D			passage	w/ louvers?
	G13	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		security	
	G14	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		security	
	G15	3'-0"	7'-0"	1 3/4"	HM, insul	metal	B			ext., secur.	
	G16	20'-0"	14'-0"	2"	mtl.,insul	stl.angle	E				
	G17	19'-0"	10'-0"	2"	mtl.,insul	stl.angle	E				
	G18	9'-0"	10'-8"	2"	mtl.,insul	stl.angle	E			safety interlock	
	G19	3'-6"	7'-0"				A				elevator hall door
	G20	6'-0"	7'-0"	1 3/4"	HM insul.	metal	A			ext., secur.	
	G21	6'-0"	7'-0"	1 3/4"	HM insul.	metal	A				full louver
	G22	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			ext., secur.	
	G23	9'-0"	8'-0"	2"	mtl.,insul	stl.angle	E				
	G24	8'-6"	7'-0"	1 3/4"	HM, insul	metal	F			security	full louver
	G25	8'-6"	7'-0"	1 3/4"	HM, insul	metal	F			security	
	G26	6'-8"	7'-0"	1 3/4"	HM	metal	C			security	full louver
	G27	6'-0"	7'-0"	1 3/4"	HM, insul	metal	C			ext., secur.	
mezzanine level	M1	3'-0"	7'-0"	1 3/4"	HM	metal	B	1 hr		passage	
	M2	3'-0"	7'-0"	1 3/4"	HM	metal	A			privacy	
	M3	6'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	M4	3'-0"	7'-0"	1 3/4"	HM	metal	A			privacy	
	M5	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	M6	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	M7	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	M8	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	M9	3'-0"	7'-0"	1 3/4"	HM insul.	metal	B			ext. secur.	
	M10	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	M11	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	
	M12	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	to Add Alternate area
	M13	9'-0"	10'-8"*	2"	metal	stl.angle	E			safety interlock	*verify max ht. w/structure
	M14	3'-0"	7'-0"				A				elevator hall door
	M15	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			security	with addn'l access panels
	M16										exter. mezz door deleted
	M17	3'-0"	7'-0"	1 3/4"	HM, insul.	metal	A			security	
	M18	8'-6"	7'-0"	1 3/4"	HM	metal	F			security	
coudé level	C1	3'-0"	7'-0"	1 3/4"	HM	metal	B	1 hr		passage	
	C2	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		privacy	
	C3	6'-0"	7'-0"	1 3/4"	HM	metal	D			security	sealed for dust control
	C4	3'-0"	7'-0"	1 3/4"	HM insul.	metal	B			security	
	C5	~21'-6"*	7'-0"	1", insul	alum	alum	G			sliding, secur.	*verify total opening width
	C6	3'-0"	7'-0"	1 3/4"	HM	metal	B			security	w/ side light
	C7	6'-0"	7'-0"	1", insul	alum	alum	G			sliding, secur.	recessed floor track
	C8	3'-0"	7'-0"	1 3/4"	HM	metal	B			passage	
	C9	3'-0"	7'-0"	1 3/4"	HM insul.	metal	B			ext. secur.	
	C10	6'-0"	7'-0"	1 3/4"	HM	metal	D			security	sealed for dust control
	C11	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	sealed for dust control
	C12	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	
	C13	9'-0"	10'-8"	2"	metal	stl.angle				safety interlock	sealed for dust control
	C14	19'-0"	10'-8"	2"	metal	stl.angle				safety interlock	sealed for dust control
	C15	3'-0"	7'-0"				A				elevator hall door
	C16	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	with addn'l access panels
	C17	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			ext. secur.	
	C18	3'-0"	7'-0"	1 3/4"	HM	metal	A			security	
	C19	8'-6"	7'-0"	1 3/4"	HM	metal	F			security	sealed for dust control
utility level	U1	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			ext. secur.	
	U2	9'-0"	10'-8"*	2"	metal	stl.angle	E			safety interlock	*verify max ht. w/structure
	U3	3'-0"	7'-0"								elevator hall door
	U4	8'-6"	7'-0"	1 3/4"	HM insul.	metal	F			security	
	U5	16'-4"	6'-6"	2"	metal	stl.angle	E				roll-up vent window
	U6	16'-4"	6'-6"	2"	metal	stl.angle	E				roll-up vent window
	U7	16'-4"	6'-6"	2"	metal	stl.angle	E				roll-up vent window
	U8	16'-4"	6'-6"	2"	metal	stl.angle	E				roll-up vent window
	U9	16'-4"	6'-6"	2"	metal	stl.angle	E				roll-up vent window
	U10	3'-0"	7'-0"	1 3/4"	HM insul.	metal	A			ext. secur.	
	U11	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	
	U12	3'-0"min.	6'-8"min.				A	1 hr			LU/LA lift hall door
	U13	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	
	U14	6'-0"	7'-0"	1 3/4"	HM	metal	C			security	
az mech. & telescope level	AM1	9'-0"	10'-8"*	2"	metal	stl.angle	E			safety interlock	*verify max ht. w/structure
	AM2	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	
	AM3	3'-0"min.	6'-8"min.				A	1 hr			LU/LA lift hall door
	T1	3'-0"	7'-0"	1 3/4"	HM	metal	A	1 hr		passage	
	T2	3'-0"min.	6'-8"min.				A	1 hr			LU/LA lift hall door
utility building	UB1	3'-0"	7'-0"	1 3/4"	HM, insul.	metal	A			ext. secur.	
	UB2	14'-0"	12'-0"	2"	mtl.,insul	stl.angle	E				
	UB3	3'-0"	7'-0"	1 3/4"	HM, insul.	metal	A			ext. secur.	
	UB4	12'-0"	12'-0"	2"	mtl.,insul	stl.angle	E				

Door Types



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SCHEMATIC DESIGN DRAWINGS

NATIONAL SOLAR OBSERVATORY
operated by the
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under cooperative agreement with the
NATIONAL SCIENCE FOUNDATION

Advanced Technology Solar Telescope
Support Facilities at Haleakalā Observatory

SCHEDULES

size D | no scale
rev B
ATST DWG-00124
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