South Pole Station Master Plan

Arctic Industry Forum

February 27, 2025

Planning at the edge of the world

Young, 2021

Stanley Consultants

ASC ANTARCTIC SUPPORT CONTRACT

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Welcome to the South Pole

M. Lucibella, 2019

Introductions

Speakers

Randy Duzan, AICP

Master Planner, Stanley Consultants

Elyse Dinnocenzo, AICP

Project Manager for Leidos ASC, Client

Julene May, PE, PMP

Project Manager, Stanley Consultants

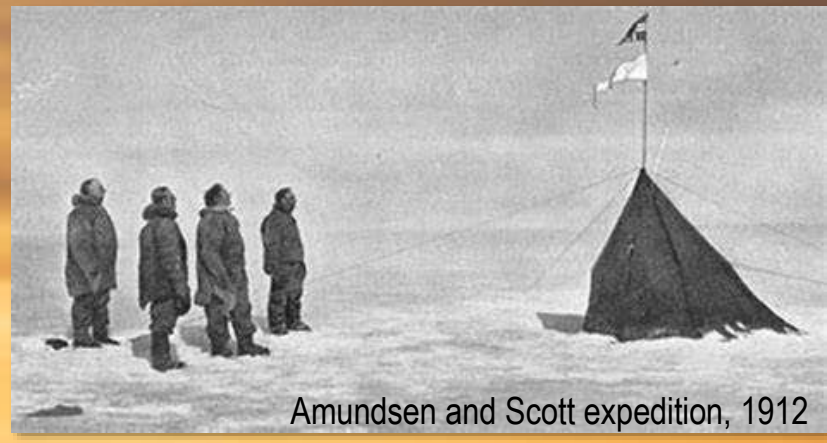
Emily Winfield, PE

Lead Mechanical Engineer, Design Alaska

NSF, undated

South Pole Station (SPS) History

- 1912: Amundsen and Scott expedition
- 1957: U.S. Navy builds Amundsen-Scott IGY South Pole Station, now known as "Old Pole"
- 1958: International Geophysical Year
- 1959: The Antarctic Treaty reserves Antarctica for peace & science
- 1975: U.S. Navy builds the SPS Geodesic Dome to replace Old Pole
- 1982: Presidential Memo 6646 appoints the National Science Foundation (NSF) as steward of U.S. Antarctic Program (USAP)
- 1991: ASMA No. 5: South Pole establishes zones & "sectors"

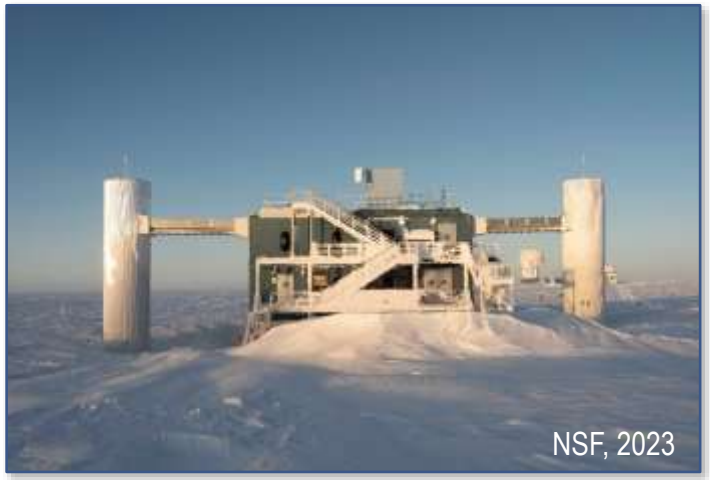


Amundsen and Scott expedition, 1912

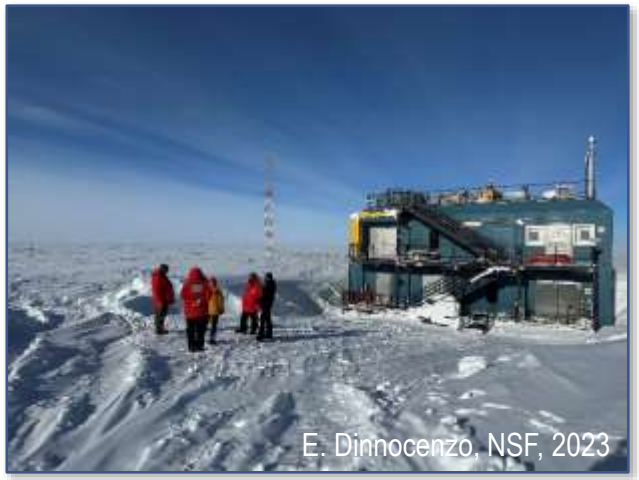
Dome Station, NOAA, Undated

South Pole Scientific Research

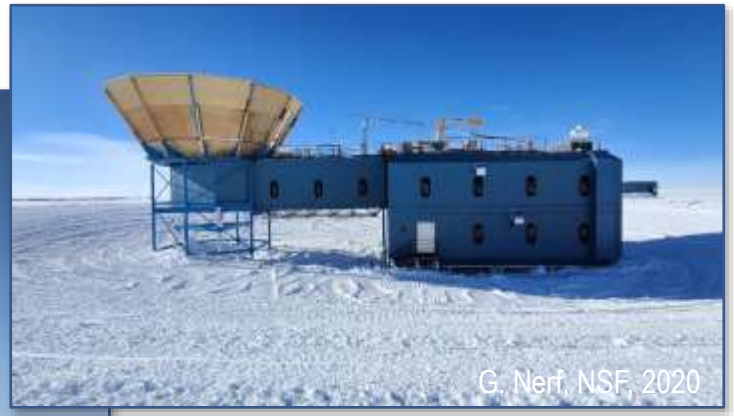
- Atmospheric Sciences
- Astrophysics and Cosmology Sciences
- Geospace Science
- Glaciology
- Seismology
- Medical Research



Ice Cube



ARO



MAPO

DSL

South Pole Station (SPS) Present & Future

- The Antarctic Support Contract (ASC) supports NSF
- 2008: Construction of the Amundsen-Scott South Pole Station ("Elevated Station") completed
- 2008+: Freestanding, external structures and adhoc storage spaces were created as needed
  - A master plan for the SPS area was never established

Elevated Station, Undated

2025 Master Plan Vision: **Modernize infrastructure and operations to continue scientific support at SPS**

South Pole Station – The Project

- Project Overview
  - Scope of Work
- Project Management and Logistics
  - Stanley Consultants, Inc.
    - Design Alaska
    - HMS

M. Wolf, 2017

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Master Planning Process

NSF, 2016

Master Planning Process

Challenges

- **Arctic Conditions**
- **Current Building Challenges**
- **Seasonal Limitations**
- **Travel Logistics**
- **Structures**


J. Corbin, 2002


J. Corbin, 1990s


NSF, 2001


Butcher, undated


NSF, 2023

Existing Conditions

- Existing Conditions
  - Blue Buildings
  - Elevated Station
  - Arches
  - Retrograde
  - Logistics

NSF, undated


Butcher, undated


NSF, 2023


J. Corbin, undated


G. Nerf, 2020

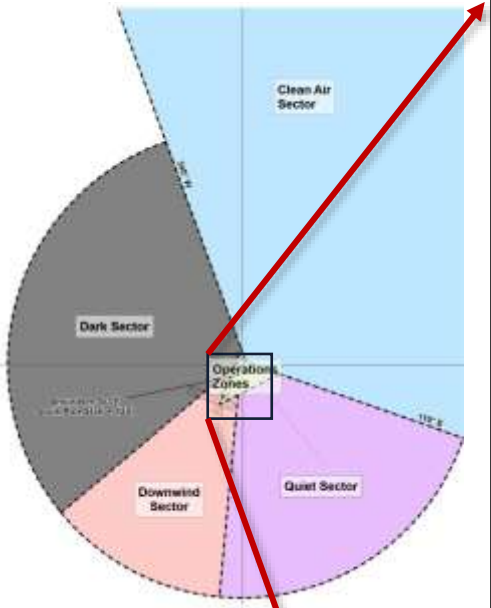

J. Corbin, 2003


J. Homeman, 2021

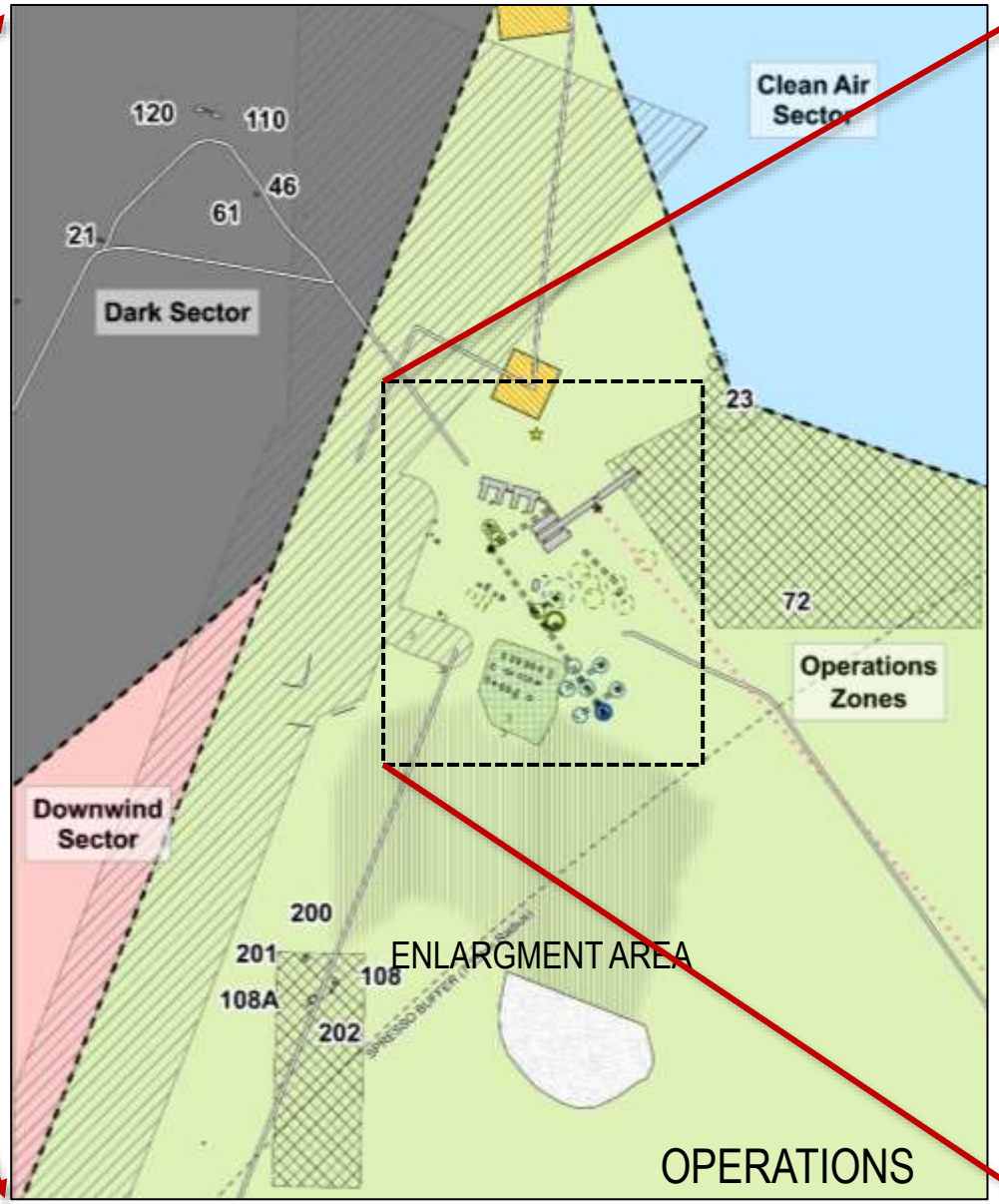

NSF, 2023


NSF, 2021

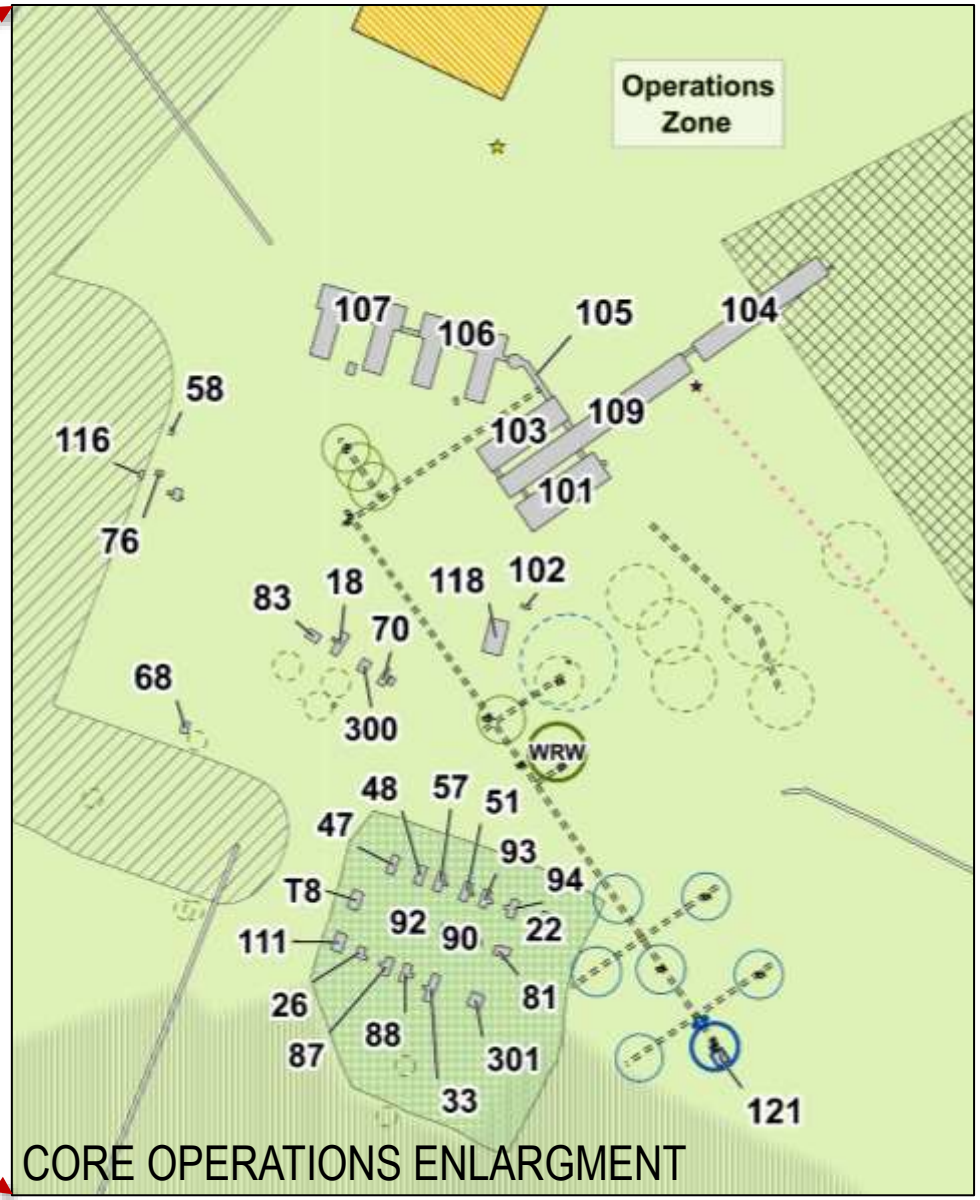
Existing Conditions



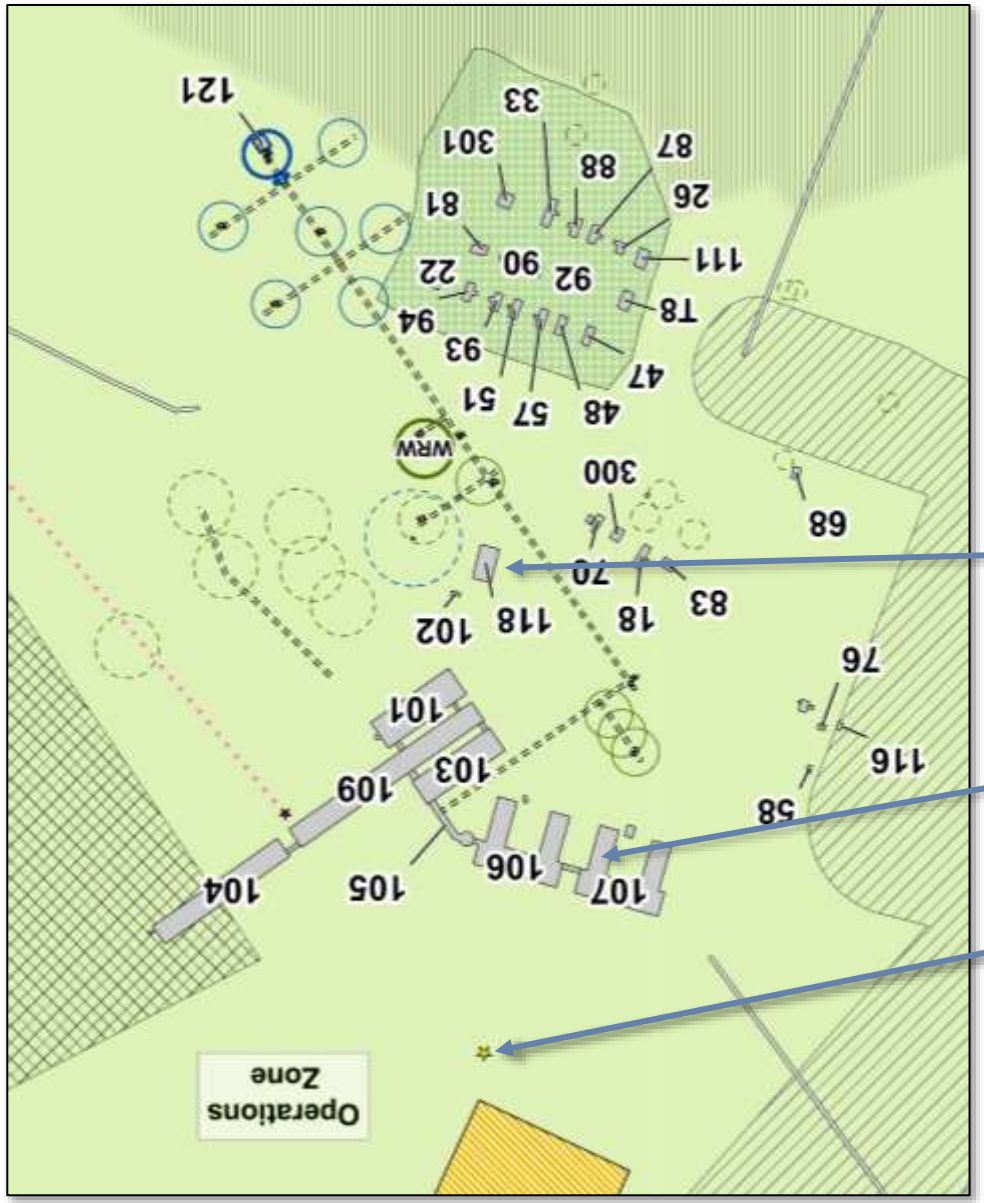
ASMA No. 5



OPERATIONS



CORE OPERATIONS ENLARGMENT



CORE OPERATIONS

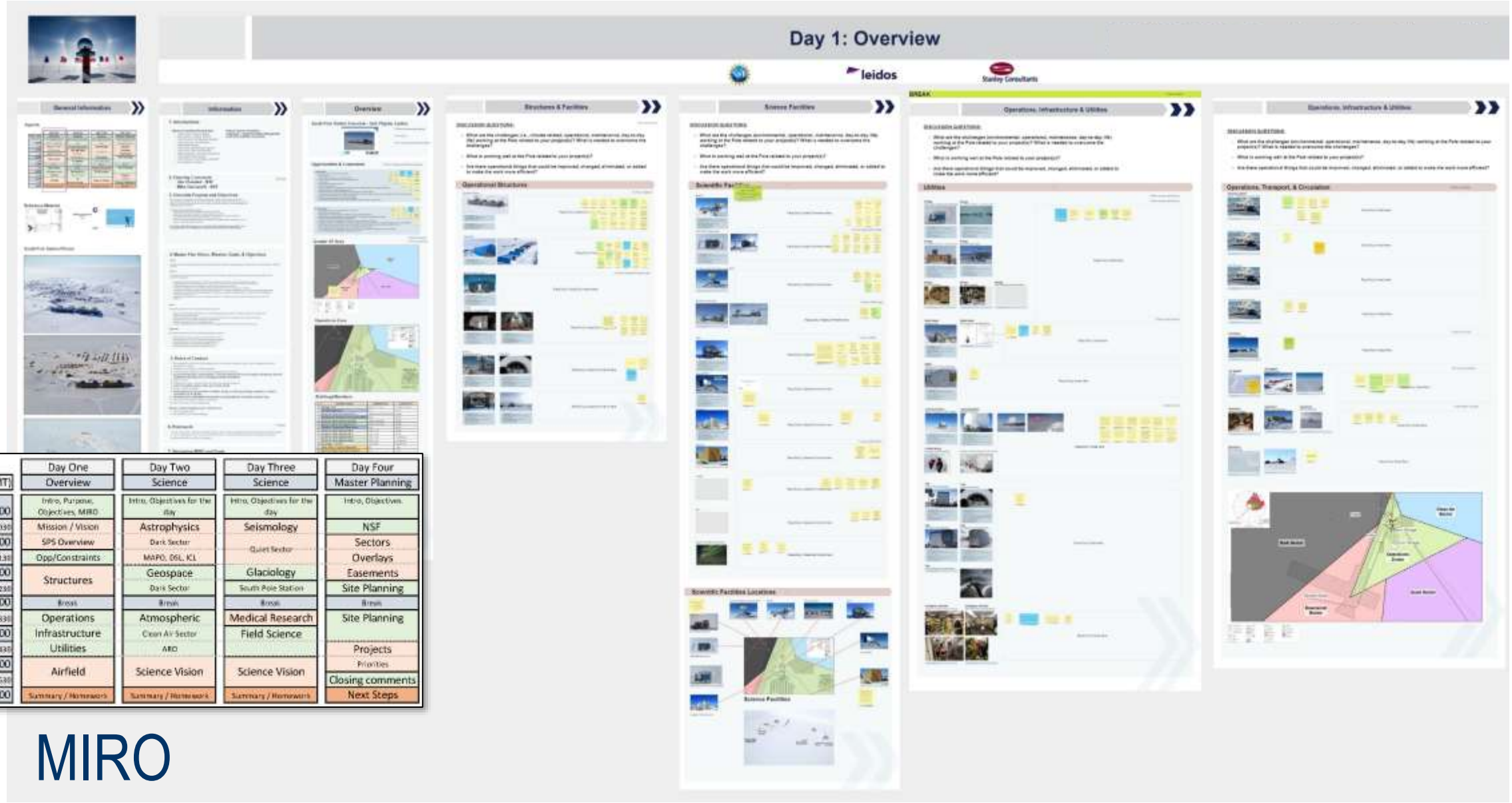
Existing Conditions

Planning Charrette

- Engagement
  - Scientific Community Involvement
  - Concerns and Recommendations
  - MIRO

Scientific Community Involvement (22)

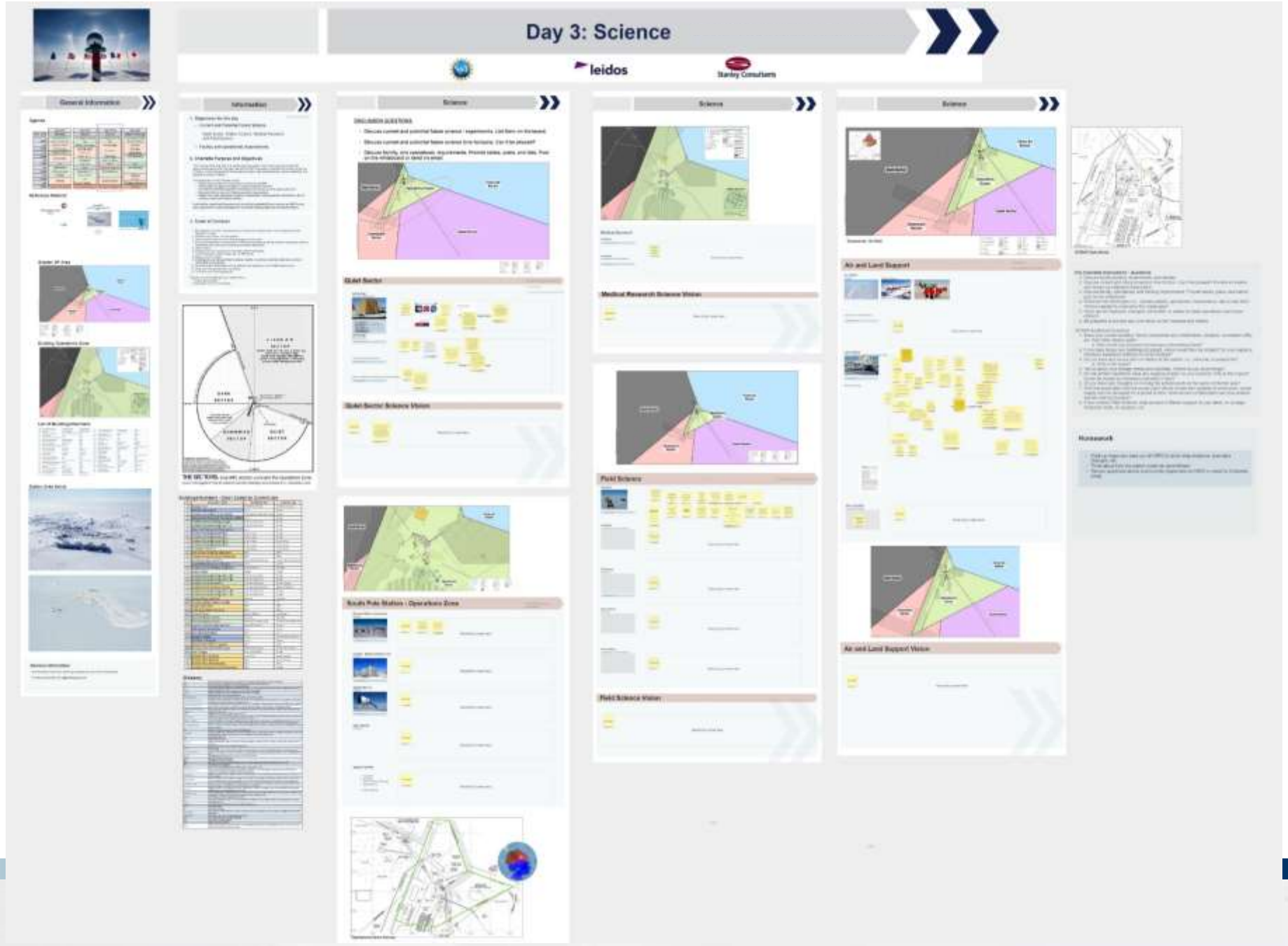
- University of Chicago
- University of Wisconsin
- MIT
- Argonne National Laboratory
- NJ Institute of Technology
- NOAA
- National Science Foundation
- CRREL
- University of Minnesota
- Department of Interior
- USAP
- South Dakota State University
- Harvard University
- Incorporated Research Institution for Seismology
- University of Washington
- University of Alaska
- NIWC
- University of California – Irvine
- University of Florida
- NASA
- Pennsylvania State University
- United States Army



TIME (MT)	Day One Overview	Day Two Science	Day Three Science	Day Four Master Planning
1000	Intro, Purpose, Objectives, MIRO	Intro, Objectives for the day	Intro, Objectives for the day	Intro, Objectives
1030	Mission / Vision	Astrophysics	Seismology	NSF
1100	SPS Overview	Dark Sector	Quiet Sector	Sectors
1130	Opp/Constraints	MAPO, OSL, ICL		Overlays
1200	Structures	Geospace	Glaciology	Easements
1230		Dark Sector	South Pole Station	Site Planning
1300	Break	Break	Break	Break
1330	Operations Infrastructure Utilities	Atmospheric	Medical Research	Site Planning
1400		Clean Air Sector	Field Science	
1430		ARO		Projects
1500	Airfield	Science Vision	Science Vision	Priorities
1530				Closing comments
1600	Summary / Homework	Summary / Homework	Summary / Homework	Next Steps

MIRO

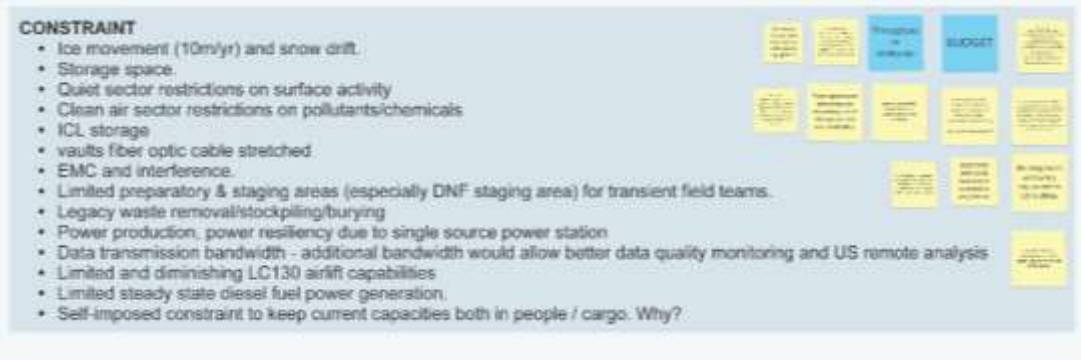
MIRO



MIRO

Collecting Data

- Voting on potential projects
- Sticking Note Comments
- Recorded Sessions

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WEBVTT

00:00:10.000 --> 00:00:32.000
And wanna welcome everybody. Who has joined us. We have several
participants from the Science community and also attendees that
are general, public, and others.

00:00:32.000 --> 00:01:02.000
And so the format today is kinda 2 fold. Everybody has called in
on a Zoom Webinar site and you're viewing a application called
Miro, which is a whiteboard technology that allows interaction by
all participants who are part of the panelists and miro allows
information to be posted photographs as you can see text and it
allows the panelists to
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Data Collection

- Developing the Master Plan
  - Data Collection
  - Stakeholder/SMEs
  - NSF and ASC

Storage Use Type	Improvised square footages					
	Berms	Out Bldgs	Arches	ES - A	ES - B	Totals
Construction	12,160	0	0	0	0	12,160
Emergency Management	160	0	180	100	0	440
Fleet	6,400	0	3,760	0	0	10,160
Food/Dry Goods	0	560	0	91	0	651
Fuels	160	320	0	0	0	480
Greenhouse	0	0	0	68	0	68
IT/Communications	160	0	0	124	237	521
Janitorial	4,000	0	0	102	99	4,201
Lodging Supplies	0	563	0	48	55	666
Maintenance	22,960	2922	56	8	118	26,064
Medical	0	0	0	0	66	66
Miscellaneous	0	0	0	38	0	38
Postal Service	0	0	0	12	0	12
Recreation	0	0	0	0	100	100
Science	640	1126	0	0	0	1,766
Store Stock	160	0	0	0	0	160
Utilities	4800	0	624	0	0	5,424
Waste	1,160	0	0	0	0	1,160
Totals	52,760	5,491	4,620	591	675	64,137

SPSMP Federal Register Review Comments

ID	Location	Comment	Commentor	Complete (Y/N)	Response
1	Pg 10	Missing support for deep field activities to support remote autonomous instruments that are important to Atmospheric, Geospace, Seismology and Glaciology sciences...	R. Clauer	Y	Deep field activities will be addressed as part of a future Field Activity Master Plan.
3	General	The Scripps CO2 program has been measuring CO2 in flasks collected at SPS since 1961. Changes to sampling criteria, sample location, or the addition of local influences has the possibility to impact our time series, so we have read the Master Plan with interest. As proposed we do not have any specific concerns with any of the proposed changes to the Clean Air Sector (which, from the Plan, seems to only be the creation of stricter controls on access to the CAS via an official easement, which we welcome). Thus, our only comment is that if the recommendation CAS 1 is followed (a new NOAA science building is built within the CAS), that the construction of it be carefully coordinated with atmospheric sampling activities (i.e., construction activities are not ongoing within a certain period before and during sampling, agreed upon in advance by relevant stakeholders).	E Morgan	Y	Thank you for your comment. Agreed coordination will be required.
4	General	Renew Antarctic Treaty to include all nations under the alliance of the United Nations	T Hunt	N	Thank you for your comment, beyond the scope of the MP.
5	General	Convert South Pole Station to alternative clean energy.	T Hunt	Y	Thank you for your comment. - The use of renewable energy is an ongoing area of study for the South Pole Station.

Master Planning Concepts

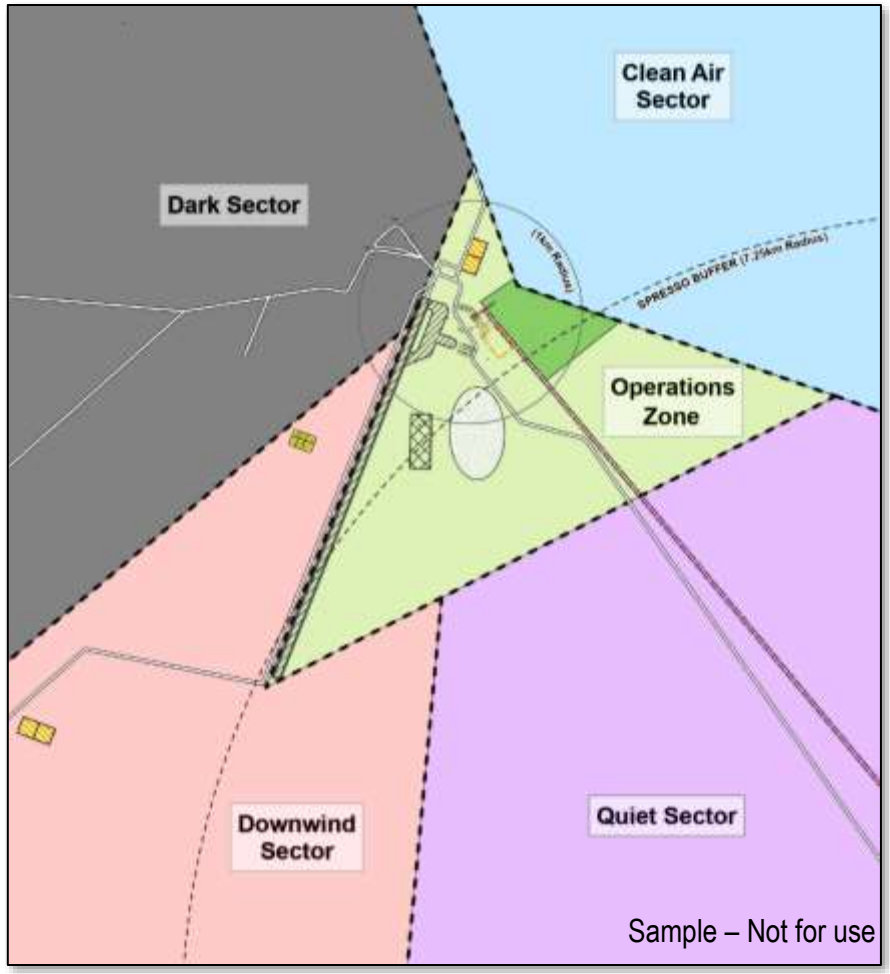
- Developing the Master Plan
  - Concepts
  - Projects

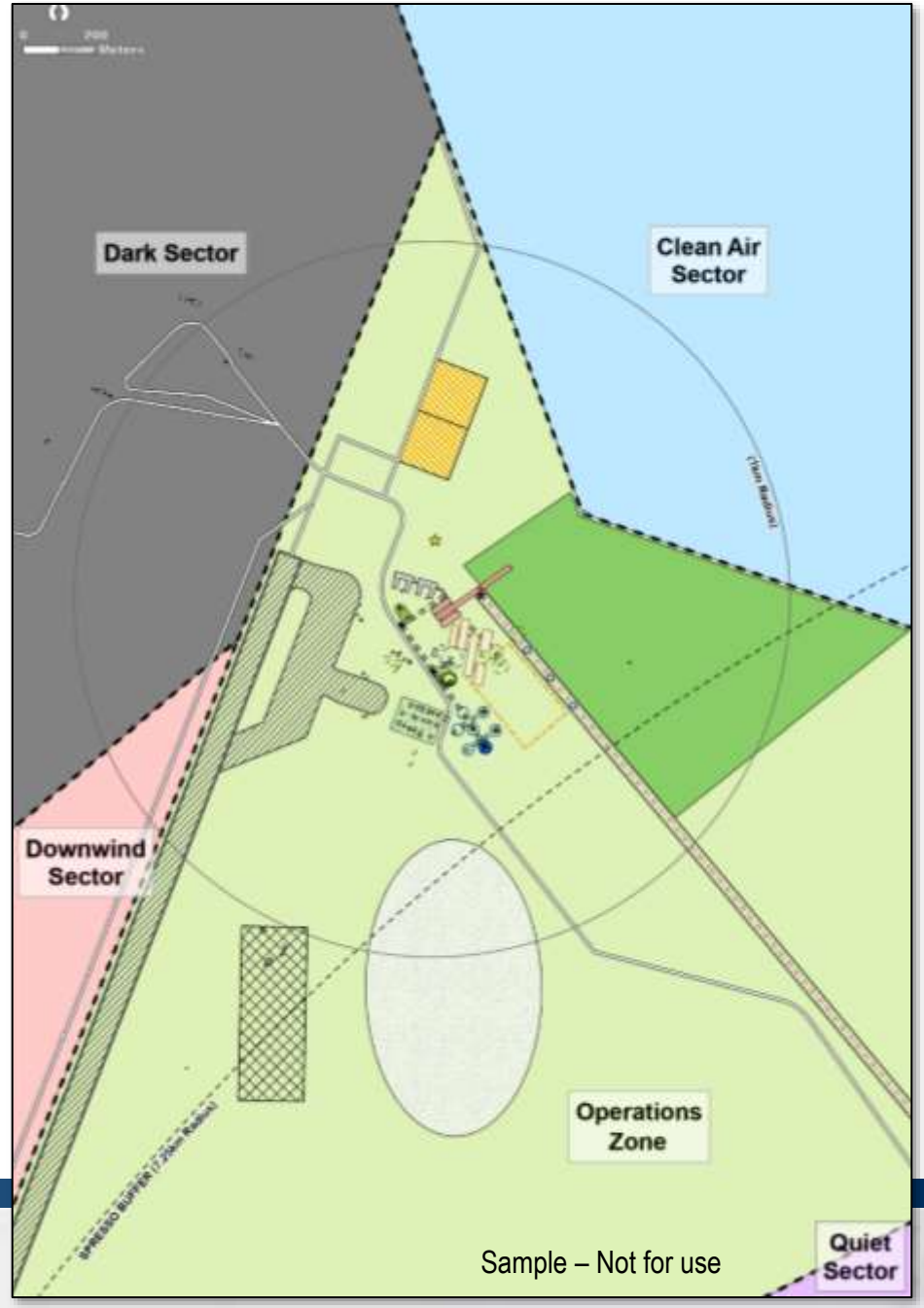
The Master Plan

- Master Plan
- Projects
  - Cost
  - Phasing
- Rendering

NSF, undated

The Master Plan





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Site Planning

2025 Master Plan Vision: Modernize infrastructure and operations to continue scientific support at SPS

PLAN IMPLEMENTATION PHASING

PHASE 1: Mobilization/Construction
This phase prepares SPS and the SPS logistics chain for major construction activities, while also raising smaller utility structures and the deepest buried science structures.

PHASE 2: Primary Infrastructure
This phase focuses on arch replacements, while also raising additional science structures.

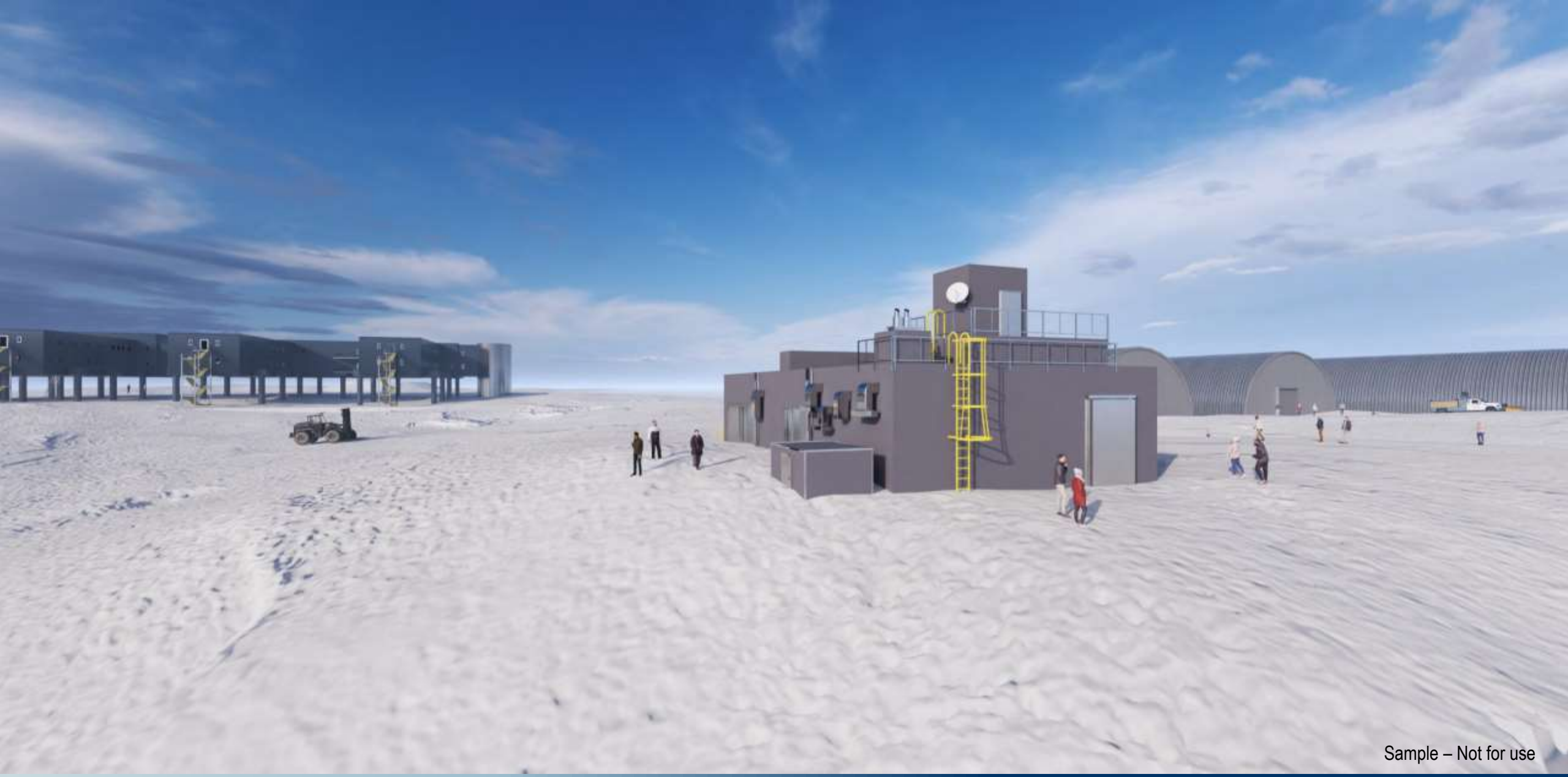
PHASE 3: Support Facilities
This phase focuses on completing the remaining arch replacement and the Elevated Station raise, while also raising the remaining science structures.

PHASE 4: Maintenance Cycles
This phase establishes maintenance rhythm for future raises and replacements to prevent future backlogs.

Sample – Not for use

Renderings

Sample – Not for use



Sample – Not for use

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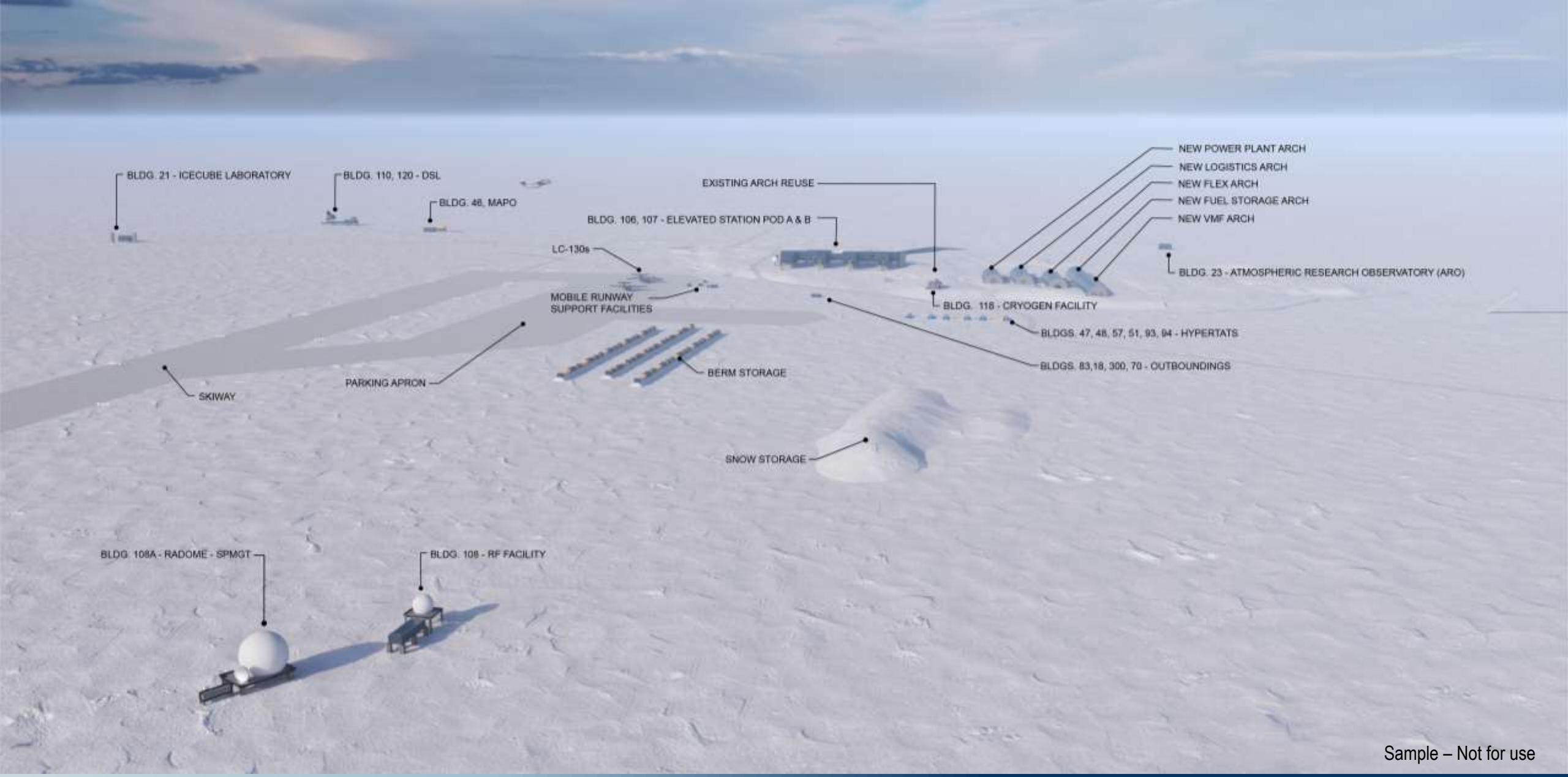

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Questions

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