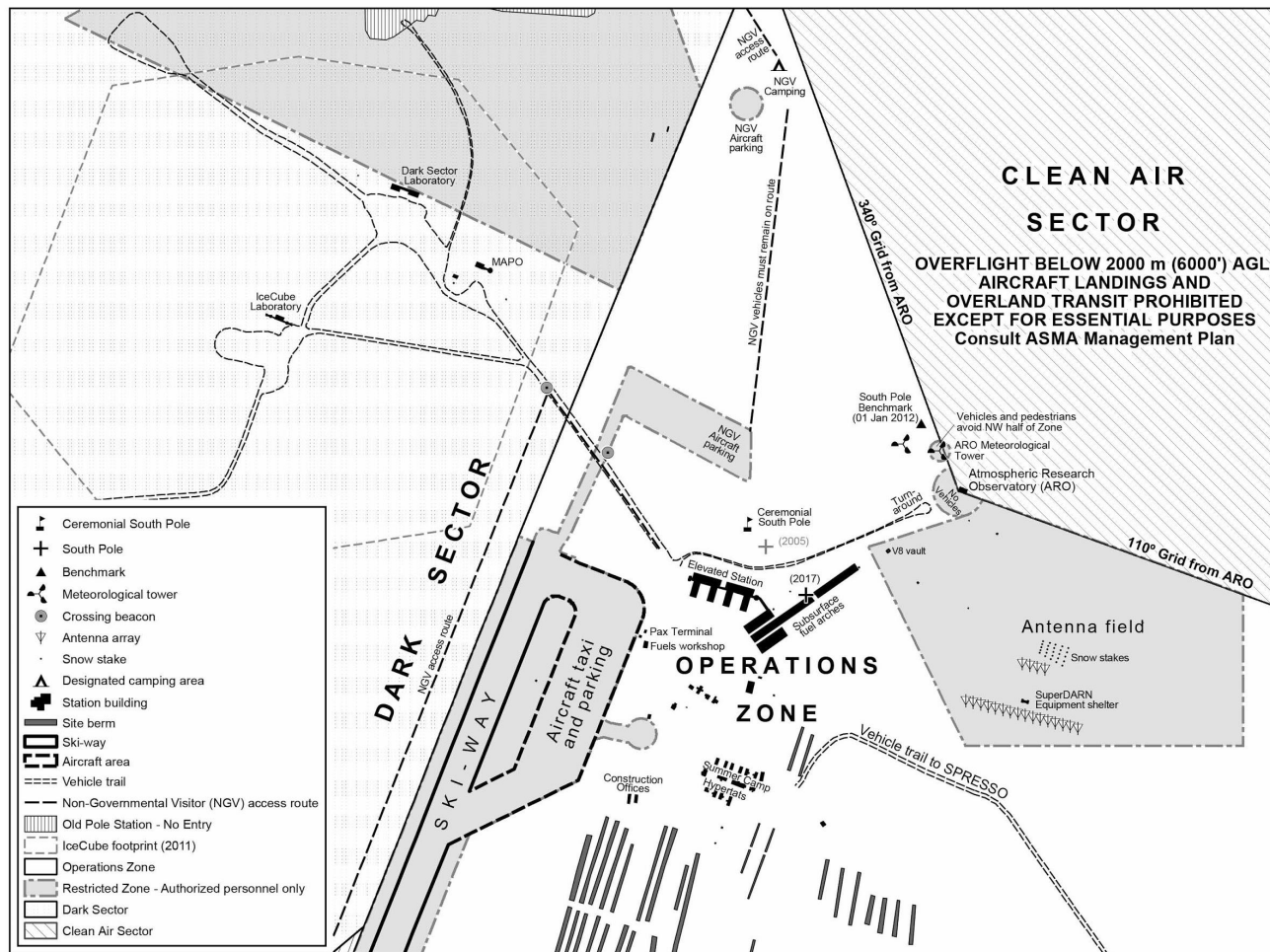




South Pole Site Layout

A. Bender
2021-03-11

Map of South Pole Station



Map 4: ASMA No. 5 - Amundsen-Scott South Pole Station



03 Apr 2017 (Map ID: 10069.014.15)
United States Antarctic Program
Environmental Research & Assessment

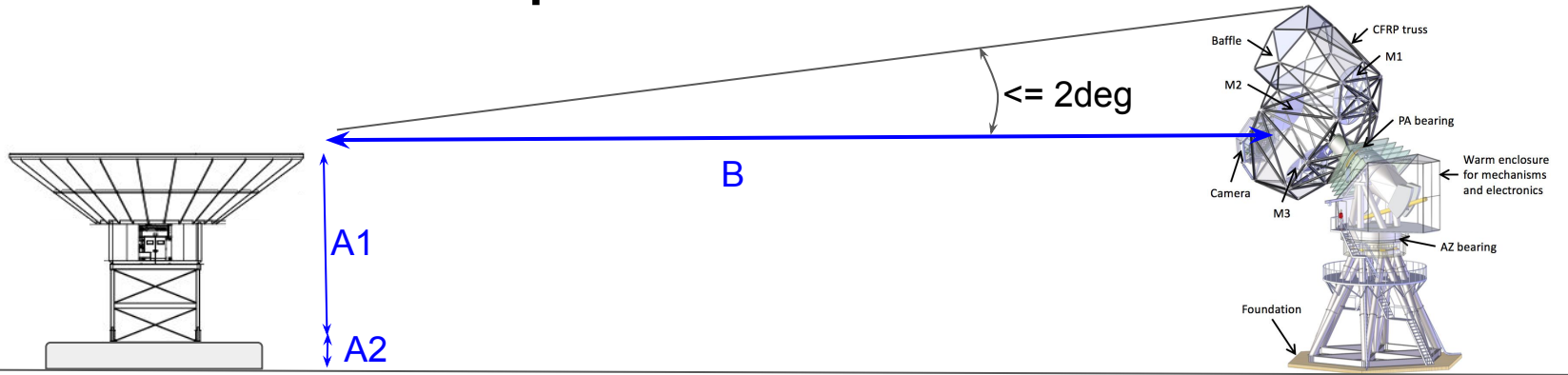


Projection: Polar Stereographic;
Spheroid and horizontal datum: WGS84;
Data source: Infrastructure: ASC CAD Survey (2016/17);
Zones & Sectors: ERA (Feb 2017).

Input Requirements

- No obstructions in view 2 degrees above lip of the SAT ground shield.
 - Informs relative placement of SPLAT & SATs, as well as providing constraints based on existing facilities (SPT & IceCube)
- Try to line up potential ground pick-up sources so they all contaminate the same azimuths
- Plan to use MAPO for supporting three SATs
- Avoid keep out zones at South Pole (skiway, IceCube, etc)
- Closer to the station is considered better
 - moving materials & people costs money
 - safety consideration for winter operations (walking out to the facility)
 - Less trenching, cable, fiber cost
- Assume ice pads are constructed at the same grade in 2023

SAT/SPLAT Separation



$A1 \sim 17.65\text{m}$
 $A2 \sim 1.52\text{m}$
 $A = A1 + A2 = 19.17\text{m}$

MAX SPLAT = 32.117 m

Assume all SATs are built
at the same 2023 grade
height as the BART tower.

$$\frac{(\text{MAX_SPLAT} - A)}{B} < \tan(2^\circ)$$
$$12.97 / B[\text{m}] < \tan(2^\circ)$$

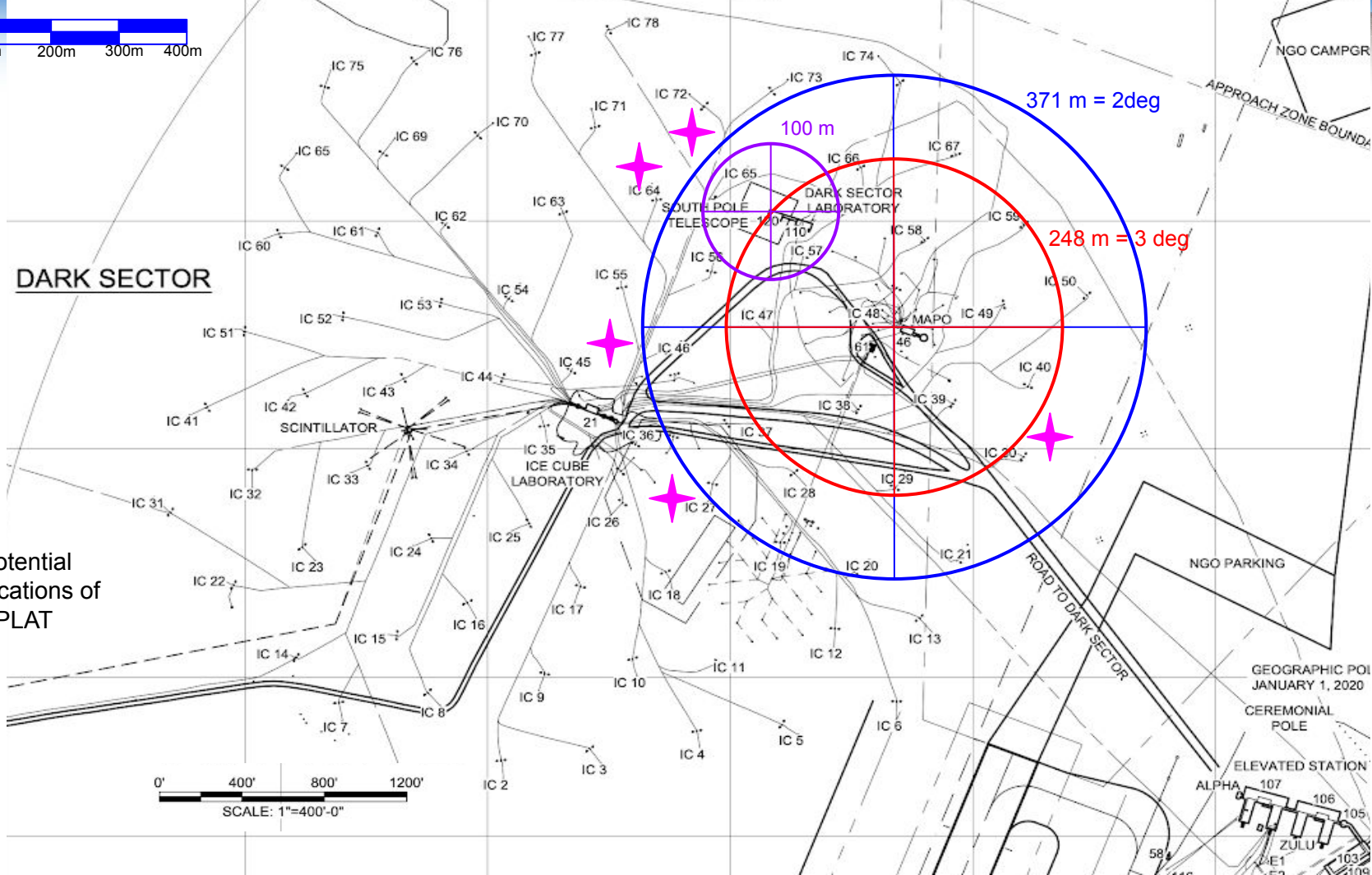
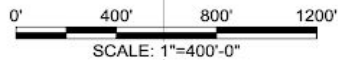
Tallest point on SPLAT must be **> 371.4 m**
away from edge of SAT ground shield



DARK SECTOR



Potential
locations of
SPLAT



SAT/SPT Separation

Repeat the exercise to check the required separation between SATs and the South Pole Telescope.

- SPT raft installed in austral summer 05/06 at 1.95 m below DSL pad
- Assume 20.3 cm of drifting snow accumulation per year.
- SPT will be $\sim 18 \text{ years} * 20.3 \text{ cm} = 3.65 \text{ m}$ below grade in austral summer 2023
- Ignore additional settling for now (will come with formal site survey)

Max SPT height above wood raft = $\sim 25 \text{ m}$

Set actual max SPT above grade = $\sim 25 \text{ m} - 3.65 \text{ m} = 21.35 \text{ m}$

Using the same geometry as before:

$$(\text{MAX SPT} - A)/B < \tan(2\text{deg})$$

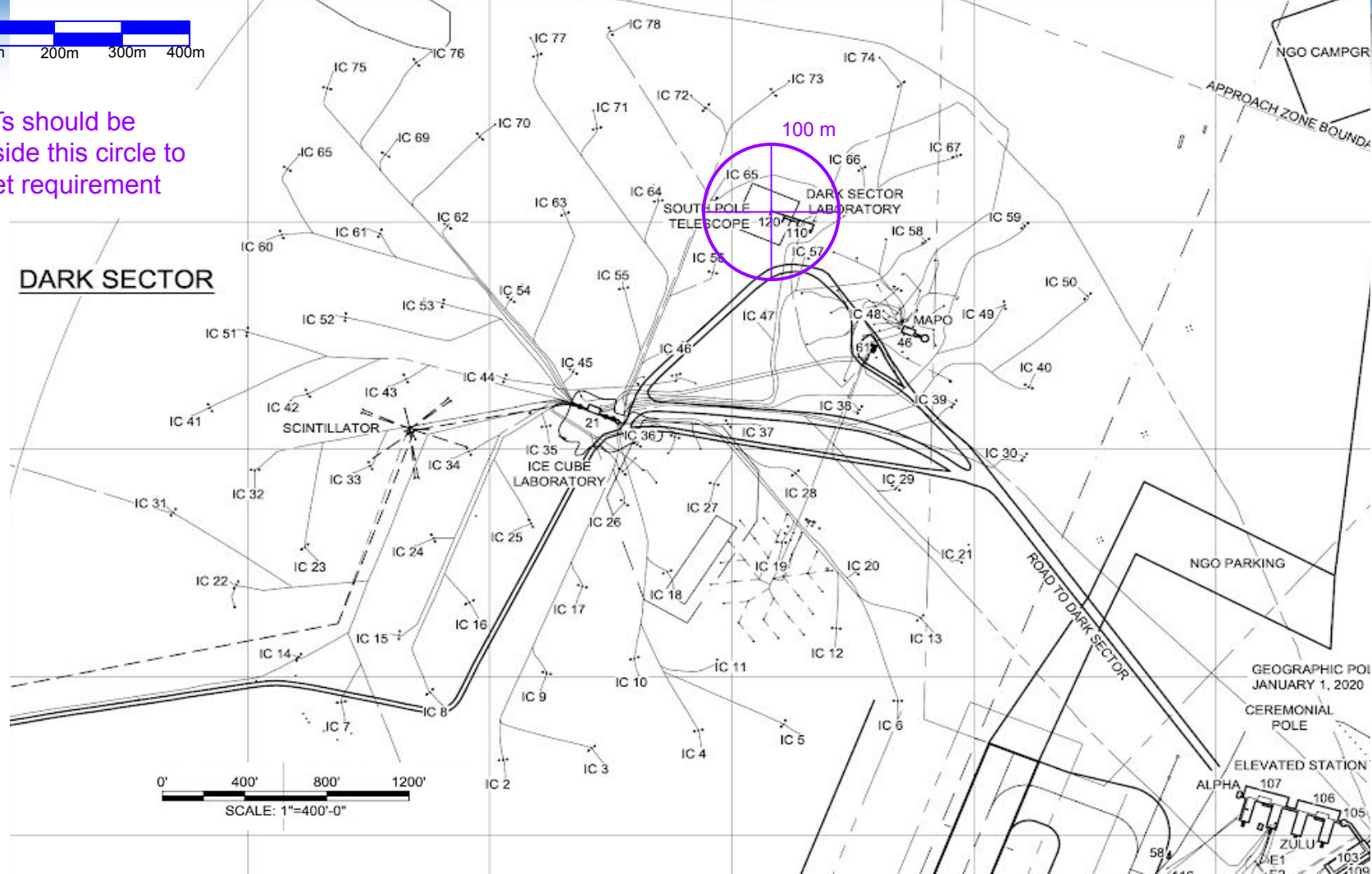
$$(21.35 \text{ m} - 19.17 \text{ m})/B < \tan(2\text{deg}) \rightarrow 2.18 \text{ m}/B < \tan(2\text{deg})$$

Nearest SAT must be at least $\sim 62 \text{ m}$ away from SPT to maintain this requirement



SATs should be outside this circle to meet requirement

DARK SECTOR



GEOGRAPHIC POI
JANUARY 1, 2020

CEREMONIAL
POLE

ELEVATED STATION

ALPHA 107

106

105

ZULU

103

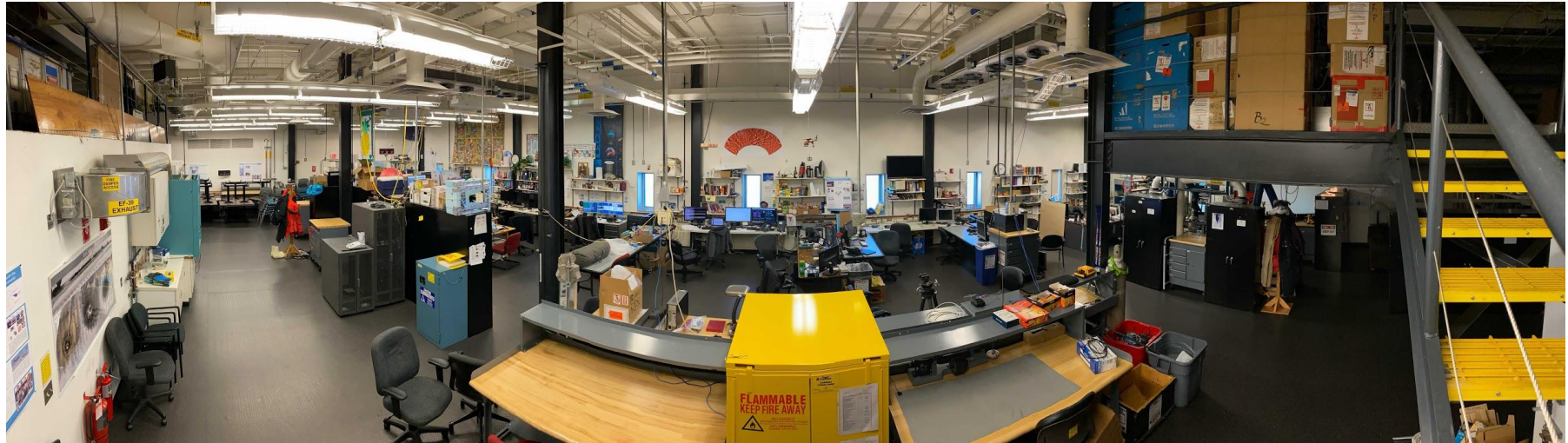
109

Data Management System

The DM system is currently baselined for the B2 science lab inside the main station.

Expect 20 standard racks. Requires 50 kW power average.

B2 layout shown on next slide.

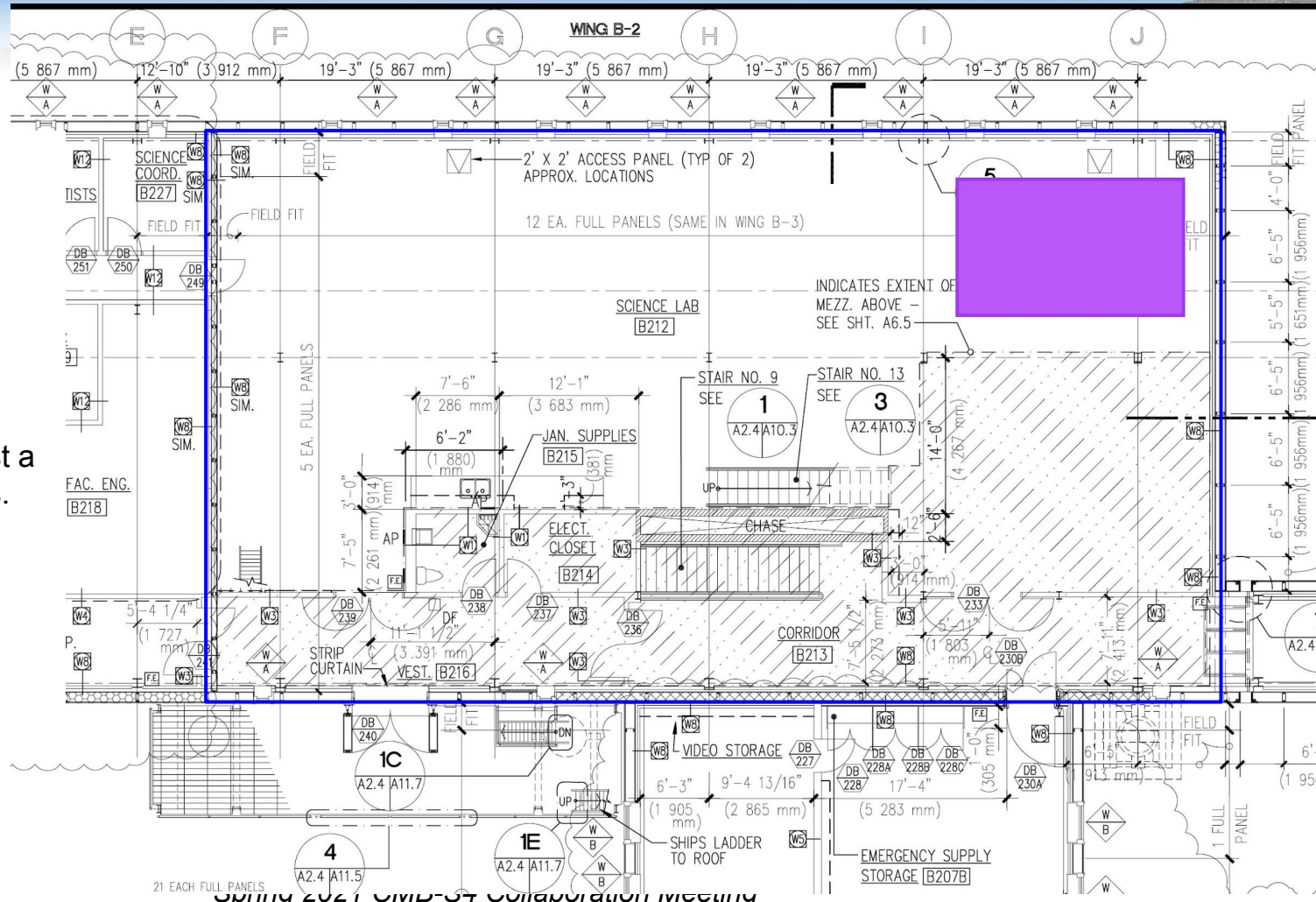


Science Lab in main station

Shared workspace among all South Pole science groups.
~364 m² total

Footprint at right is just a guess for the 20 racks.
~6m x 3m

Continue to refine footprint & search for alternatives.



Action Items

- Determine more specific requirements for SPT ground pick up restrictions.
- Designate positions for second set of SATs & new building
- Update position of SPLAT
- Continue to refine location of data management system
 - Alternative possibilities to protect work environment in science lab?
- Start defining runs of power & data cables to improve cost on raw materials