Sanford Underground Research Facility
4850L UG Laboratory Expansion Concepts

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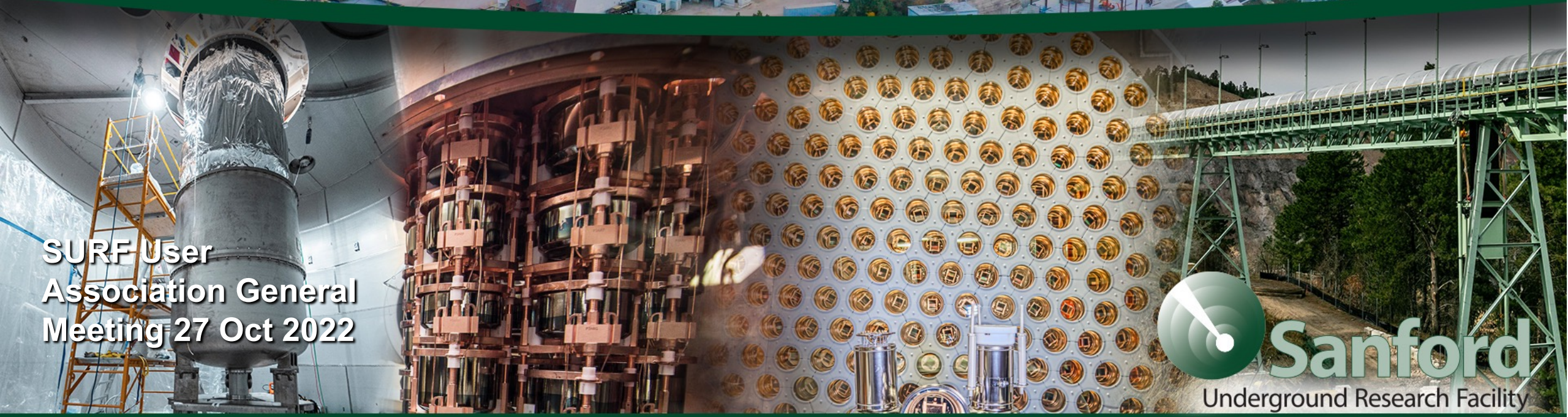
SURF User Association General Meeting 27 Oct 2022



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South Dakota Science and Technology Authority

Topics

- Assessment Overview
- New Construction Requirements
- Phasing and Results
- Phase Schedule
- Summary/Next Steps

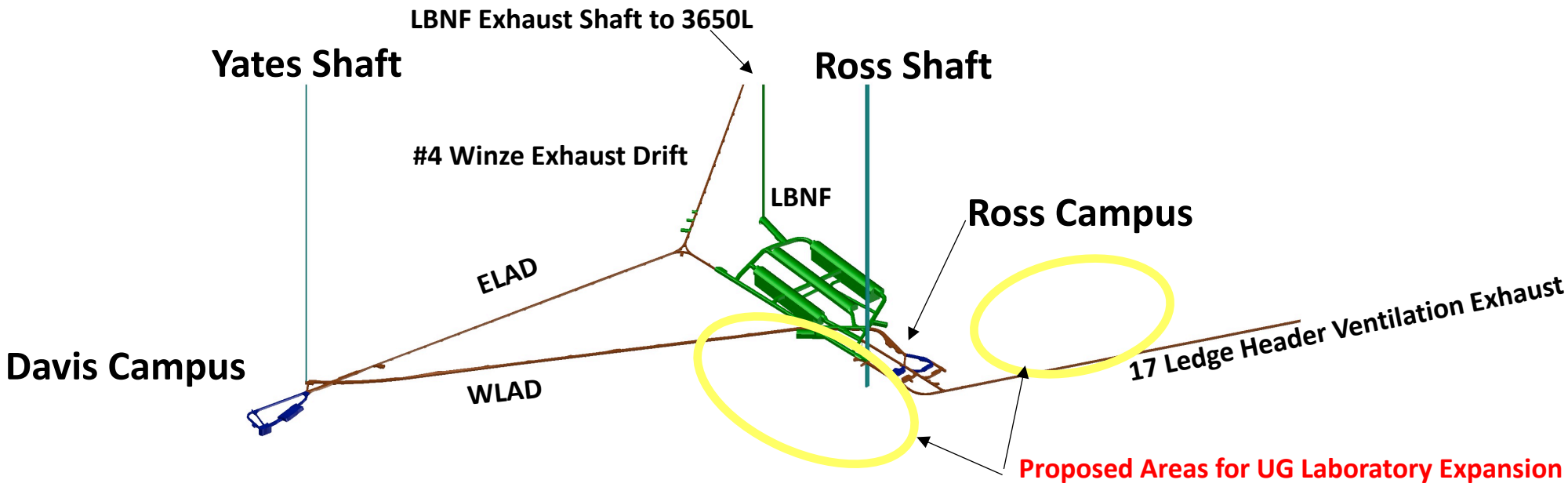
4850L Lab Expansion Assessment - Stantec

- Stantec is an internationally recognized AE firm servicing the mining & construction industry for over 58 years.

Assessment Study Deliverables:

- **Confirm SDSTA's 4850L Lab Expansion Concept(s)**
  - Locations/Maintain Access/Ventilation/Waste Handling/Geotechnical
  - Phased Construction Potential – Future Expansions
- **Formal Report documenting the Expansion Plans**
  - Useful communications tool for SURF – *(Plan for future Science Space)*
- **Produce a Budgetary Estimate & Construction Schedule**
- **Generate "Next Steps" Planning/Budgeting Info**

New Construction Requirements – 4850L



New Construction Requirements:

- Positive geotech site conditions
- Access to fresh air ventilation
- Minimize negative impact on existing Science Ops
- Access to exhaust air routes
- Access to waste dumps
- Phased construction plan

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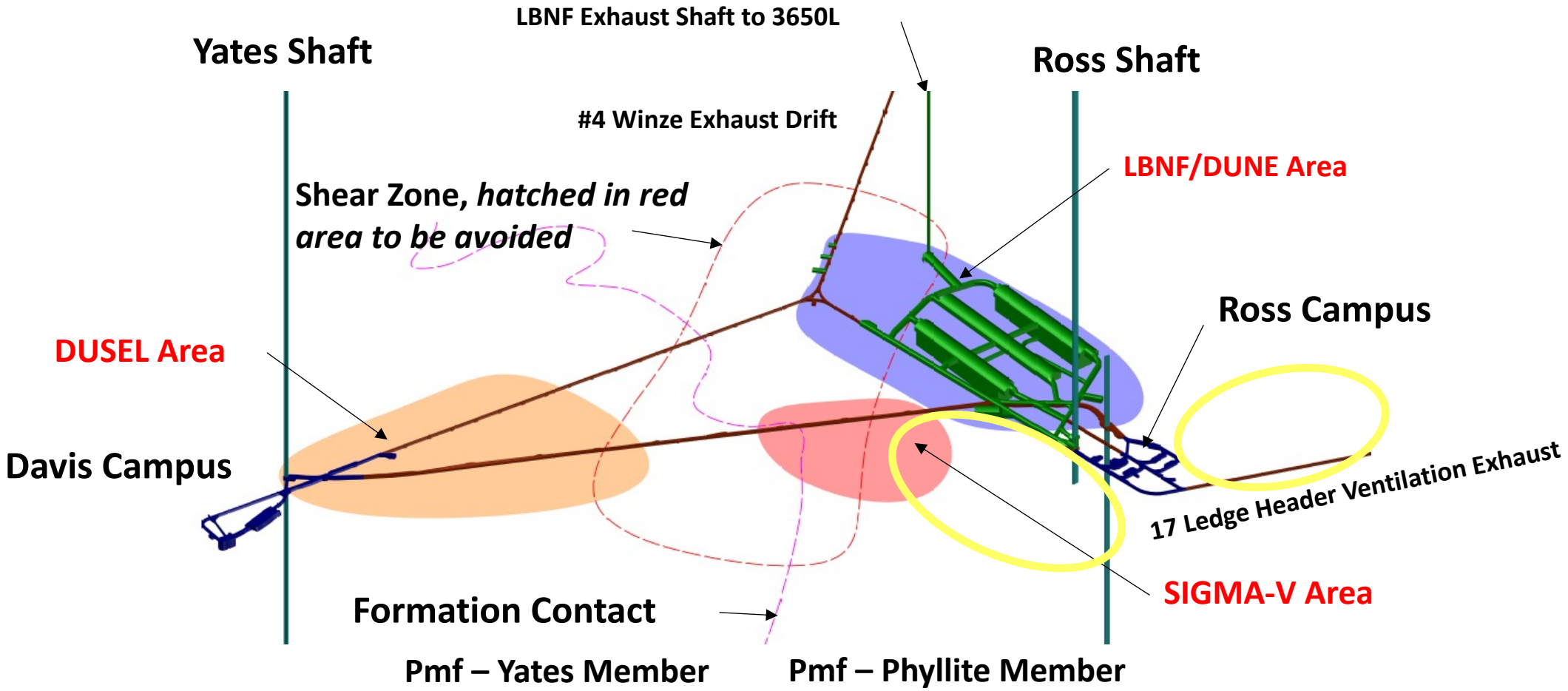
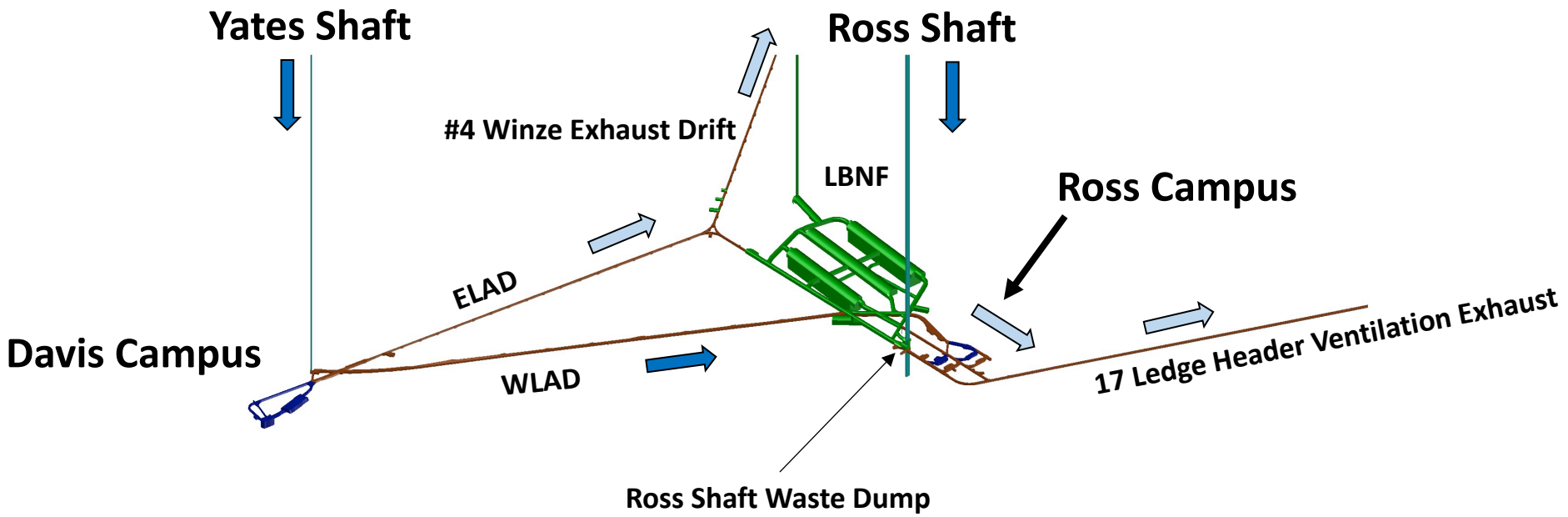
Existing 4850L Geotech Evaluation Areas



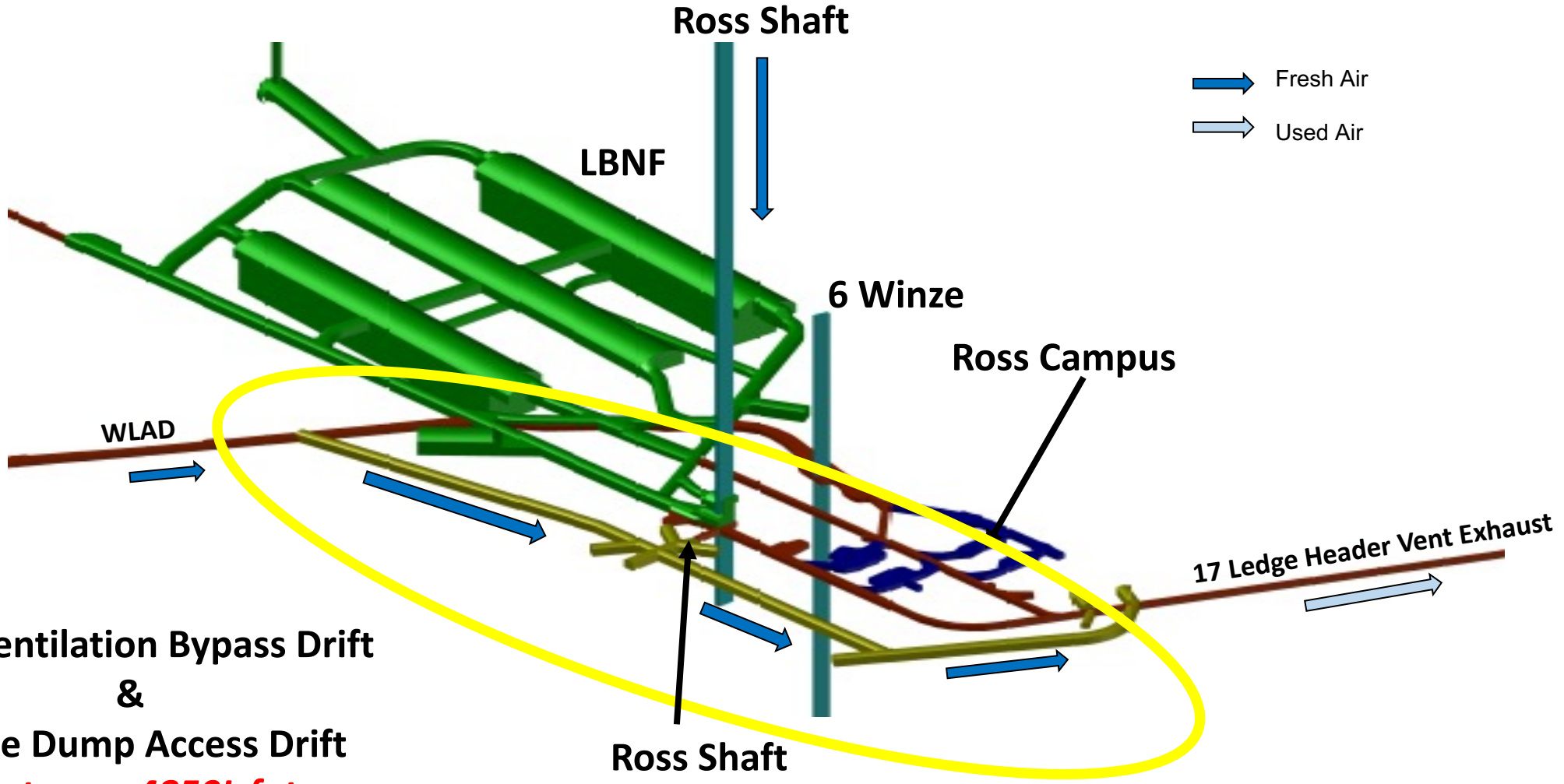
4850L Ventilation Pathways



Fresh Air

Used Air

UG Laboratory Development: Phase 1



New Ventilation Bypass Drift
&
Waste Dump Access Drift
*****Key to any 4850L future development*****

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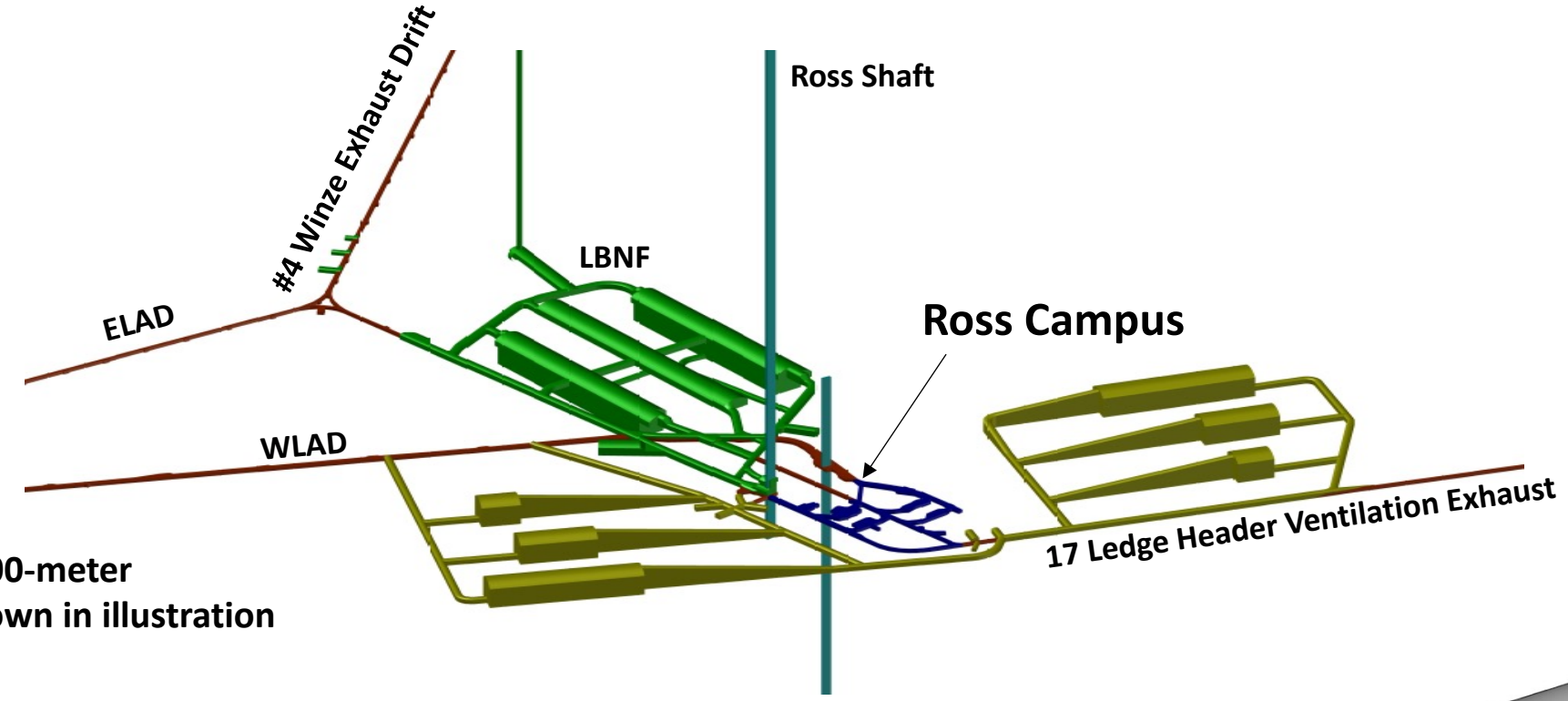
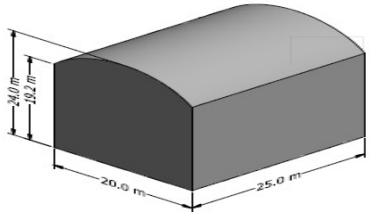
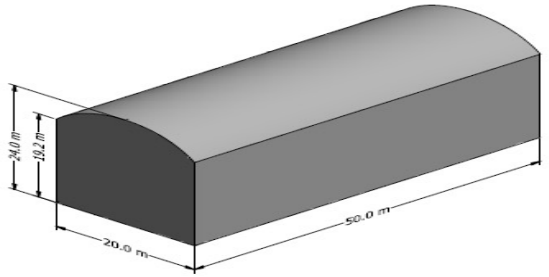
Phase 2 & Future Expansion Capacity



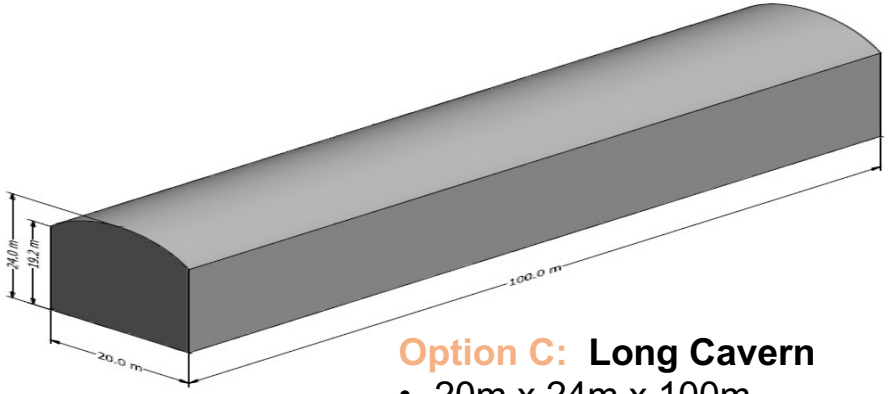
Note: 25, 50 and 100-meter Cavern Options shown in illustration



Option A: Small Cavern
- 20m x 24m x 25m



Option B: Short Cavern
- 20m x 24m x 50m



Option C: Long Cavern
- 20m x 24m x 100m

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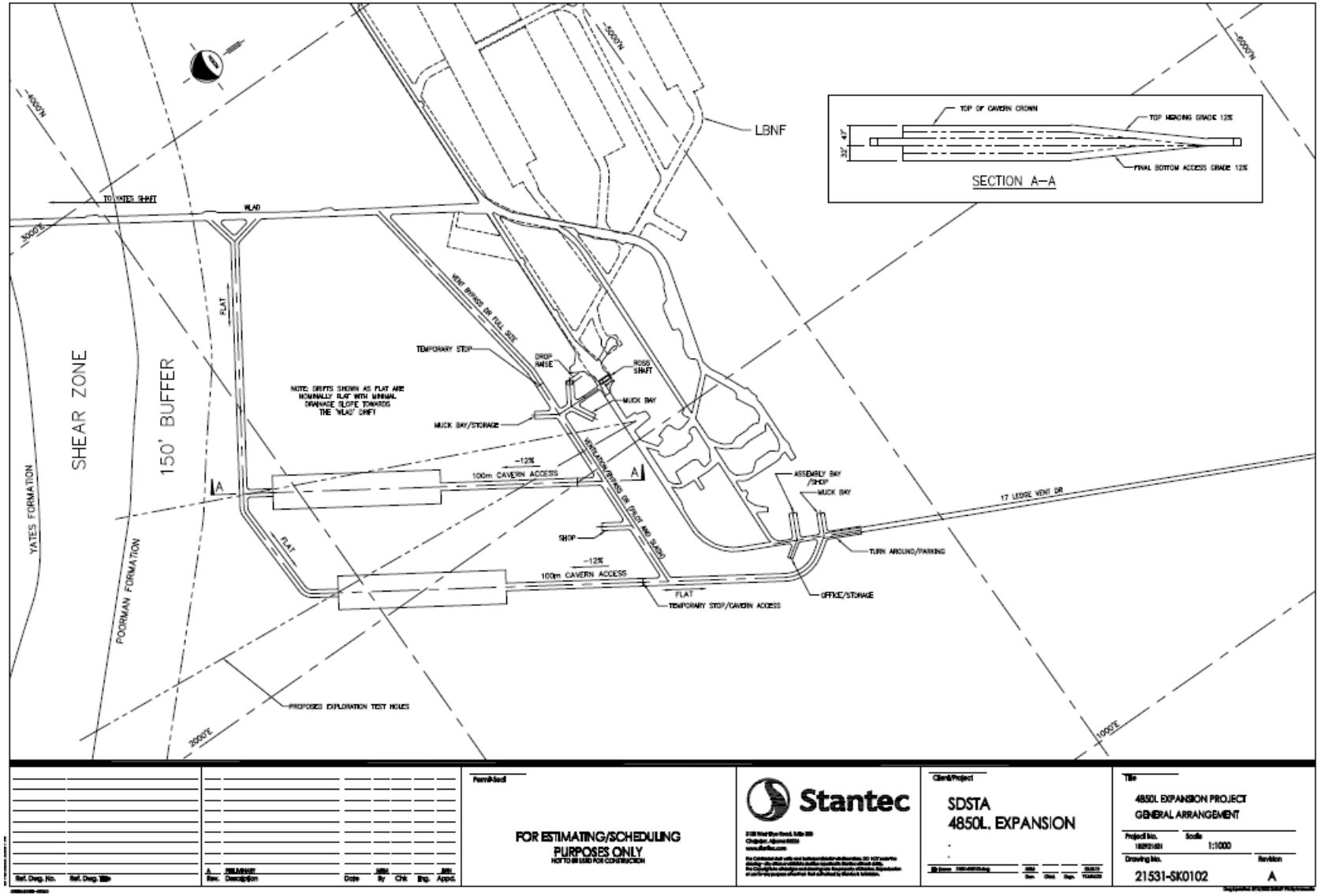
4850L UG Lab Expansion – Dual 100m Cavern Phase 2 Concept

Stantec Follow-up Work

- Two 100m cavern expansion
- Dual heading excavation
- Updated Cost & Schedule



Stantec Assessment Results

- **The current ventilation plan is adequate to support future 4850L UG Laboratory Expansion plans**
  - Ventilation requirements for a particular future science experiment were not evaluated
- **Proposed laboratory expansion locations provide adequate isolation and separation from existing Science Ops**
  - Access to Ross waste dump and blast isolation doors for excavation
- **Positive geotechnical site locations based upon prelim info**
  - Suggest additional geotechnical study at specific site locations to verify
- **Study provided a Cost & Schedule for phased construction**

Construction Schedule

ACTIVITY	Duration (Months)	Year 1	Year 2	Year 3	Year 4	Year 5
		O N D J F M A M J J A S	O N D J F M A M J J A S	O N D J F M A M J J A S	O N D J F M A M J J A S	O N D J F M A M J J A S
Phase 1 Excavation - Ventilation ByPass Drift & Waste Dump	9	X X X X X X X X X				
25m Cavern & Access Drift Extensions	11	X X X	X X X X X X X X X			
50m Cavern & Access Drift Extensions	15		X X X X	X X X X X X X X X X X		
100m Cavern & Access Drift Extensions	21			X	X X X X X X X X X X X	X X X X X X X X

- **Phase 1 – By-Pass Drift, Infrastructure, Waste Rock Dump**
  8-10 months

- **25m Cavern & Access Drifts**
  11 months

- **50m Cavern & Access Drifts**
  15 months

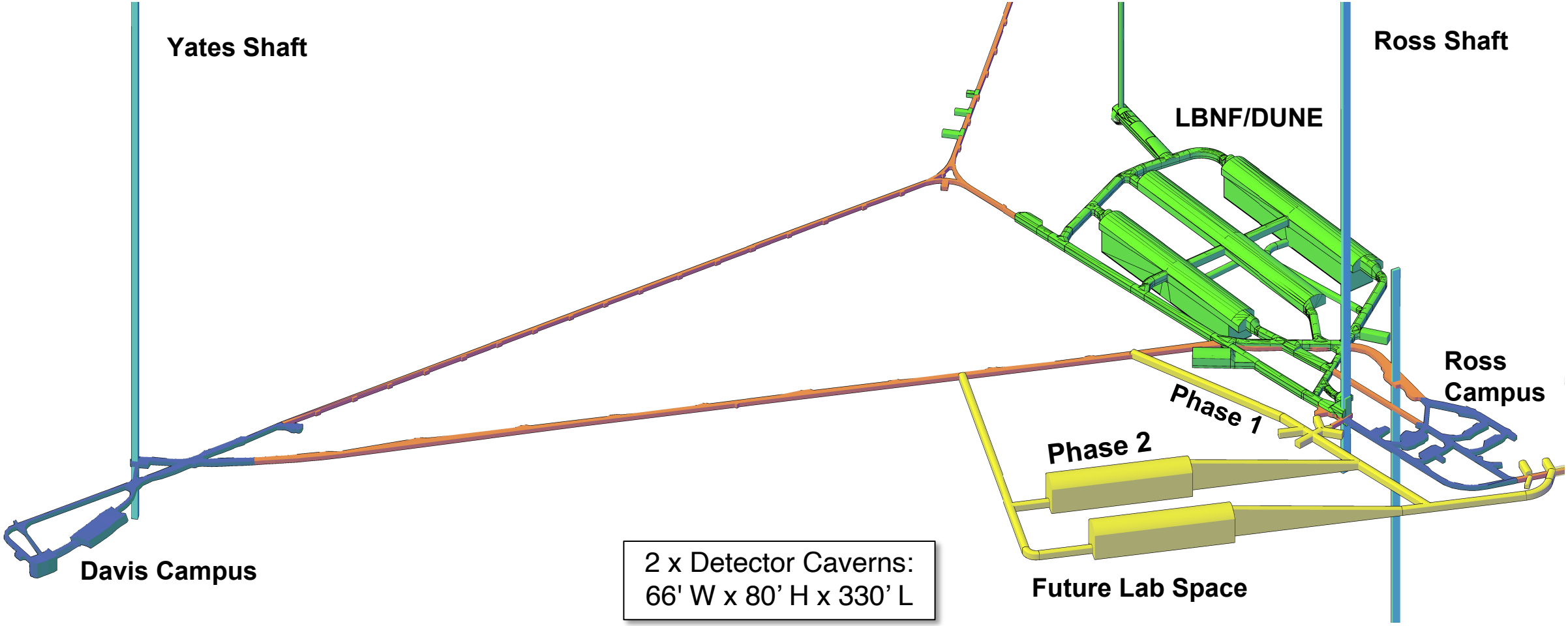
- **100m Cavern & Access Drifts**
  21 months

Assumes single-heading excavation which results in longer timeline. Reduced timelines possible if multiple heading excavation is employed.

4850L Development Summary/Next Steps

- **Conduct additional Geotech Investigations w/ Phase I Design**
  - Leverage existing LBNF, Sigma V and DUSEL data.
- **Initiate Phase 1 to develop ventilation by-pass & waste dump access drift.**
- **Preliminary Design - Phase 2 Cavern Space(s)**
  - Based on requirements for a specific science experiment
- **Final Design**
- **Implementation**

4850L Development Summary



2 x Detector Caverns:
66' W x 80' H x 330' L