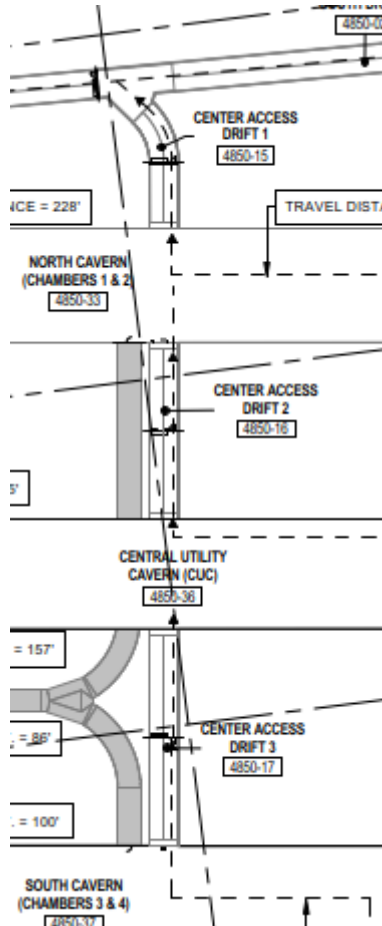


Meeting minutes from VE discussion at CERN 29-Jan-2019

- N/S Access Drifts
 - Drifts 4850-16 and 17 can be reduced by some amount. Can we propose a reduction of 1 m? We should consider the material that may be moved through 4850-15 before reducing this as materials have to travel around the curve before entering the North cavern. I've included an image below to identify the drifts in question.



ID	Object Heading	Object Text	Rationale
Note:		FSCF-Engr-015: Need to ensure that the detector and cryo equipment (LN2 dewars) would fit through the central access drifts.	
FSCF-Engr-015	Component Delivery to chambers	FSCF shall design facility geometry to allow delivery of equipment and materials as follows: All cryostat components shall be delivered from the Ross shaft to the east and west ends of the detector caverns. All detector components shall be delivered from the Ross shaft through the central detector cavern	

		accesses, including passing through the CUC and the west end of the detector caverns. All equipment to be used in the CUC shall be delivered through either the east end of the CUC or the central drift leading to CUC.	
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- Shotcrete in drifts
 - No shotcrete required in drifts. There was a comment that a tighter pitched mesh should be evaluated in the crowns.
- Shotcrete in CUC
 - No requirement for shotcrete on the walls of the CUC.

ID	Object Heading	Object Text	Rationale
Note:	FSCF-Enr-007: This requirement implies that there is shotcrete on the CUC walls. Look at the rationale as well.		
FSCF-Engr-007	Cavern Moisture	FSCF shall provide drainage and sumps sufficient to prevent standing water accumulation on cavern slabs on grade. Visible moisture appearing after the application of shotcrete does not require mitigation. This applies to both the detector caverns and CUC.	The interior of cavern shotcrete walls and concrete slabs on grade shall provide systems to manage water penetration to inner surfaces. Some moisture is acceptable and will be managed locally by the experiment as necessary.

- Shotcrete in N and S cavern
 - No science requirement for shotcrete on detector cavern walls below 4850 beside the cryostats (nonmetallic bolts/mesh?) This includes the space between the cryostats.
 - If the mesh is changed, it should still meet the current requirements for metallic vs non-metallic from the electronics document

ID	Object Heading	Object Text	Rationale
Note:	FSCF-Engr-007 requirement implies that there is shotcrete on the cavern walls. Look at the rationale as well.		
	FSCF-Engr-182: This requirement includes coating on walls below 4850 between the cryostats		
FSCF-Engr-007	Cavern Moisture	FSCF shall provide drainage and sumps sufficient to prevent standing water accumulation on cavern slabs on grade. Visible moisture appearing after the application of shotcrete does not require mitigation. This applies to both the detector caverns and CUC.	The interior of cavern shotcrete walls and concrete slabs on grade shall provide systems to manage water penetration to inner surfaces. Some moisture is acceptable and will be managed locally by the experiment as necessary.

FSCF-Engr-182	Coating of cavern walls above 4850 and in between cryostats	FSCF shall include some coating or sealant to the shotcrete surface of the caverns above the 4850 level and to the walls between the cryostat warm structures down to the 4910 level. This is to minimize dust and improve light reflectance.	
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- Agreed to eliminate excavated notches for ducts. The experiment will work with FSCF to find a solution. I will set up a working meeting to look at alternative solutions.

ID	Object Heading	Object Text	Rationale
Note:	FSCF-Engr-021: Provision of exhaust duct from 4910 to main exhaust duct. This is still true, except that the routing may change. Need to finalize this.		
FSCF-Engr-021	Condensation	FSCF shall provide a minimum exhaust rate of 15,000 cfm per detector module along with an exhaust duct from the 4910 L to the main exhaust duct for condensation purposes	Analysis work indicates that this will prevent condensation formation along the bottoms and sides of the cryostats

- Eliminate all picking eyes, but leave bolts sticking out (wrapped to keep shotcrete from sticking) so they can be added where needed later.

ID	Object Heading	Object Text	Rationale
Note:	FSCF-Engr-071: This requirement will have to be rephrased to clarify that FSCF will not provide lifting eyes. FSCF-Engr-127: This requirement will have to be rephrased to clarify that FSCF will not provide lifting eyes.		
FSCF-Engr-071	Mezzanine support	FSCF shall provide attachment points for the mezzanine platform for installation of proximity cryogenics in each chamber and also provide the provisions to add lifting eyes to the rock bolts in the standard pattern (1-m X 1-m pattern, with each having a capacity of minimum 10 metric tons) in the crown over the mezzanine as per requirements specified by cryo systems	

FSCF-Engr-127	Lifting eyelets for LAr Pumps	FSCF shall provide lifting eyelets on the ends of the rock bolts with the standard spacing grid (1 m X 1 m, with each eyelet having a minimum capacity of 2 metric tons) in the crown of the caverns above the LAr pumps to aid LAr pumps installation/maintenance	
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- Eliminating clean agent fire suppression system
 - DUNE is evaluating dedicated fire suppression systems for the racks in the DAQ room. In parallel, it should be determined if having these in place, could the room fire suppression be eliminated. And then determine what is the most cost-effective solution.

ID	Object Heading	Object Text	Rationale
Note:	FSCF-Engr-058: This requirement needs to be updated when the design choice for fire suppression is finalized.		
FSCF-Engr-058	Fire Suppression Systems	FSCF shall provide fire-suppression sprinklers in the Far Detector caverns of the pre-action type for protection of the electronics. In the underground data processing room, the fire suppression system and media shall be designed to minimize damage to electronics	

- Eliminate galvanized steel everywhere
- Eliminate trapeze between caverns and CUC
- Eliminate condenser reheat, but address concern about temp/humidity before detectors running
- Evaluate battery powered, wireless networked, security locks rather than wired

ID	Object Heading	Object Text	Rationale
Note:	FSCF-Engr-179: Is this card access requirement on wireless network?		
FSCF-Engr-179	Secure access	All LBNF surface and underground facilities shall have an identification card access system to gain entry to LBNF facilities. Card access technology shall allow employees and users with SDSTA ID cards having proximity technology to access doors with this technology. The card reader access system shall be programmable at a central location	

New ideas:

- Eliminate concrete floor at east end (everything past 4850-15) – contractor decision whether floor is mud slab or rock
- Combine ventilation in DAQ and control rooms if code allows
- Utilize the space on the 3m extension of the cavern extension above 4850 for the AHU on the west ends of the caverns to reduce the amount of addition space to be excavated.

ID	Object Heading	Object Text	Rationale
Note:			
FSCF-Engr-041	Far Detector Installation	FSCF shall ensure that a portion of the area above the North-South bridge, a volume defined on the clearance envelope drawing F10043159, shall remain clear of utilities to allow for detector installation.	Cannot have any utilities passing through this space to allow installation of the clean room. This is a result of removal of rock septum as described in CR-0249 and docdb-8058.
FSCF-Engr-075	Monorail Extension	FSCF shall ensure that the monorail beams extend 3m into the eastern-most and western-most drifts to facilitate loading of the cryostat pieces, and that they are continuous along the entire length of North and South caverns one (includes chamber 1 and 2) while allowing the portion over the N-S bridge to be removable. The center monorail should extend an additional 5 m at the west end of the detector caverns for a total of 8 m beyond the edge of the detector pit. This extension shall allow for the hook to pick large items from	This is a result of removal of rock septum as described in CR-0249 and docdb-8058

		the drift entrance with the hoist mounted on same at a distance of 8 m from the edge of the detector pit.	
FSCF-Engr-112	Clean room	FSCF shall make available a space with sealed concrete surfaces in the floor spanning the entire distance between cryostats 1 and 2 and cryostats 3 and 4, to accommodate the Far Detector group's construction of a class 100,000 clean room. The concrete under the cryostats shall not be sealed.	The clean room environment inside the detector caverns, enveloping the cryostat loading area will be supplied by the Far Detector group. This is a result of removal of rock septum as described in CR-0249 and docdb-8058
FSCF-Engr-146	Bollards in CUC	FSCF shall provide removable type bollards in CUC with the in-ground sleeve flush with the floor finish surface to protect cryo equipment in CUC.	Additional requirements/specifications as per docdb-6596
FSCF-Engr-148	Compressed air	FSCF shall provide a standalone compressor supplying compressed air at 500 acfm @90psig, distributed along the length of the CUC east of the FSCF structure with ¾" connection points every 30 feet along the south wall. FSCF shall also include a main header to the each cavern with connection points at the north entrance of each of the detector caverns. four corners of the bridge and at the four corners of the space between cryostats at the 4910L. The compressed air should meet ISO 8573.1 for solid particles, water and oil contaminants.	This utility will be needed to operate the pneumatic valves, air powered tools, clean pieces after machining before installation, etc.