

# Far Site Update and Planning

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LBNC Review

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# Topics

- FSCF design and construction start update
- Reliability Projects status
- Property considerations
- Cryogenic Infrastructure Update
- Far Site Interfaces
- Coordination with SURF Operations
- Risks related to LBNF Far Site
- Summary

# FSCF Design

- Pre-excavation: design complete
  - Last 100% final design submittal of pre-excavation tasks (Ross Headframe) was received on schedule in early April.
  - FSCF Pre-Excavation 100% Final Design submittal design review with all stakeholders completed in May. Stakeholder “leaders” are being asked to “sign-off/approve” this submittal. This process will become a standard process for final design submittals.
- EXC & BSI final design to start soon
  - Interface coordination meeting in May at Fermilab. Resolved CUC footprint clashes and discussed dual phase feed-through design compatibility with mezzanine plans.
  - Another interface coordination meeting completed this week. Discussed updates to cryostat design, preparation for the August cryostat review in August at SURF, Ross cage requirements, CADD integration, and plan for mezzanine design start.
  - Final draft of Arup Requests for Proposal (RFPs) for the EXC and BSI final design completed. The start of these tasks are scheduled to coincide with award of the FSCF CM/GC contract.
  - Planning initiated for a FSCF commissioning firm. RFP drafted and under internal review.



# Preparation for Construction Start

- Conveyor procurement in process of award
  - CF staff completed Construction Quality Management (CQM) provided by the Corps of Engineers in Chicago (March) and in South Dakota (May).
  - Adding addendum to LBNF/DUNE QA Plan for CF CQM techniques
  - Identified a roster of candidates to serve on the Dispute Resolution Board (DRB) for the Far Site construction.
  - Identifying candidates to serve as facilitator for FSCF Partnering sessions.
  - Reviewing options for a web-based PM system for Far Site construction, to be provided as part of the CM/GC contract.
  - CF leadership (Pelletier) now spending one week a month in South Dakota. Lundin is in South Dakota one week every other month.
  - To enhance project visibility CF attended the 2017 Rapid Excavation and Tunneling Conference (RETC) in June. Held every two years, RETC is the largest collection of underground engineers, contractors, academics, and other in this field in the world.
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## Early Construction Start Status – Tramway Tunnel Rehab

- Had been planning for SDSTA to execute tramway through subcontracts and were almost ready to proceed with the contract.
- Recently possible conflicts of interest arising from existing SDSTA contracts and terms in the FRA prime contract have led the project team to conclude this is no longer feasible.
- Evaluating whether to include in CM/GC contract or contract separately from FRA
- Including in CM/GC reduces procurement effort and overall risk from CM/GC for possible delay and coordination, however many factors need to be evaluated in order to determine best procurement strategy.
- With funding delays, seems to be time-neutral
- 2 other early ventilation rehab scopes by SDSTA are also under evaluation
- More in management breakout on revised contracting approach

# **SURF Reliability Projects - assure safe & reliable construction**

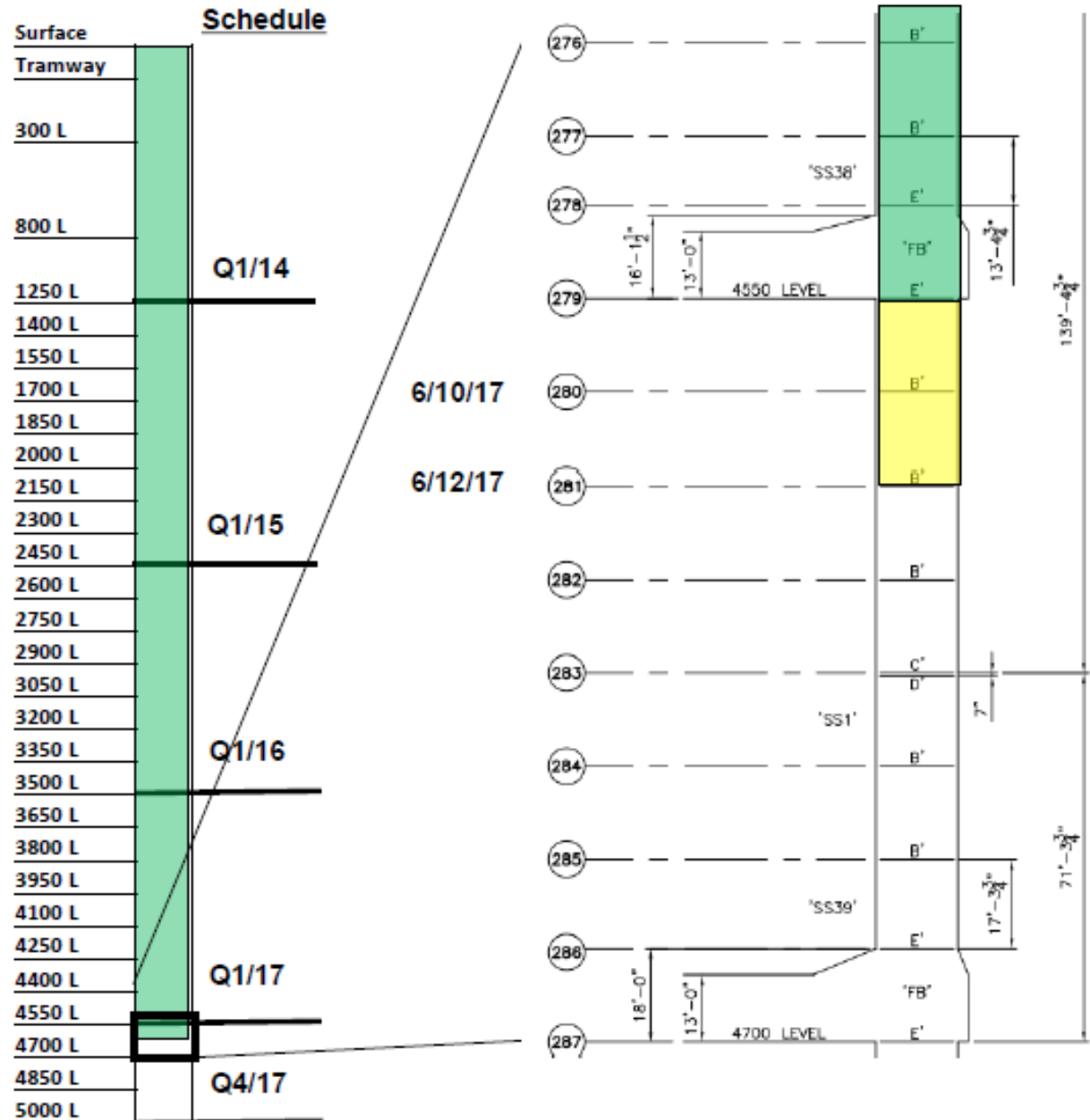
## **Part of FSCF**

Reminder of scope:

- Oro Hondo Fan rehabilitation – main exhaust fan
- Refuge Chamber Capacity Increase for 96 hours from 72 to 150 people to meet underground personnel needs
- Hoist Infrastructure to assure safe, reliable operation
  - DC Motor Rebuilds
  - Drum Bearings & Bushings
  - Variable Speed Drives & computer hoist controls
  - Clutches & Brakes
- Cage/skip replacements – none exist today
- Had planned contract with SDSTA; in process of revising to contract either through CM/GC or in separate FRA contracts
- FY18 funding delays appear to even out these options.

# Ross Shaft Rehab progress

- Pause in set installation in April due to cash flow and CR
- SDSTA evaluating non-conforming wood guides for cage
- Processing change to add mods to very bottom for spilled rock handling
- Completion Jan 2018





# Ross Shaft Rehab photos



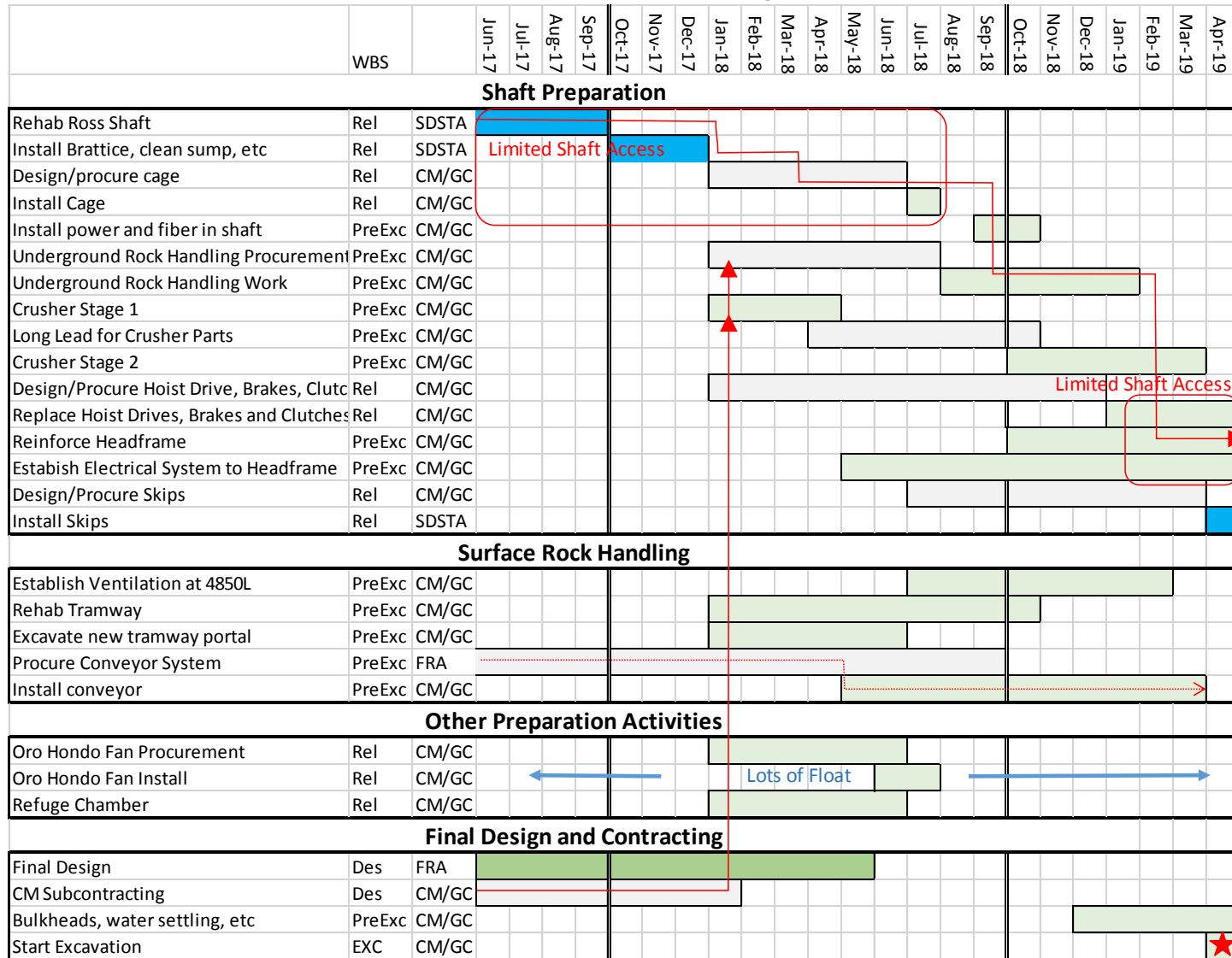
Removing old set

Steel set 280 staged & ready to be installed



Does not reflect changes to FY18+ funding – will discuss impacts in management breakout

# Preparation for Excavation summary schedule



# Property Considerations

- DOE-SDSTA lease executed for LBNF-dedicated spaces in May 2016
- Temporary Construction Easement Exhibit in place – exhibit describing spaces permits amendments as space needs change.
  - Currently have Ross shaft in TCE
  - Amended version for add'l work to be approved by SDSTA Board of Directors on 22 June
- Exemptions from DOE Senior Realty Officer required for improvements of nonDOE property with federal funds
  - Required for all LBNF construction
  - Started doing one by one for each task – Tramway submitted for DOE approval
  - Trying to achieve broader approval - will be further discussed in management breakout

# Cryogenic Infrastructure Design Update - 1

- Cryostat
  - CERN continues to refine the design
  - External final design review planned for 21-22 Aug at SURF
  - Protego side penetration valve installed in protoDUNEs – important element for LBNF
  - CERN starting design work on steel mezzanine
- LAr Procurement
  - 5 vendor visits in December provided better understanding of market
  - Issued follow-up RFI in May to collect cost information and confirmation of feasibility of the supply chain, etc.
  - Expect replies by early July





## Cryogenic Infrastructure Design Update - 2

- LN2 systems:
  - Preparing LBNF LN2 system Functional Design Specifications.
  - LN2 system Acquisition Plan iterating with DOE.
- Proximity Cryo on Mezzanine:
  - Advancing the design to define the size and location of the cryostat penetrations to inform the cryostat design.
  - Working with Far Detector on location of penetrations
- Central Utility Cavern (location of LAr/GAr Purification skids, LN2 dewars, piping, LN2 cold boxes, etc.):
  - Finalizing layout & resolving clashes in preparation of the start of the CF Final Design.
- Reviewed the sizing calculations for LAr/GAr Purification skids and optimized the number and size of the filters.
- Updating the P&IDs.

## Far Site Interfaces

- Meeting regularly to work issues
  - Bi-weekly phone meeting with all parties with focused topics
  - Face-to-face meetings every few months (May, June, Aug)
  - Recent work resolved clashes in Central Utility Cavern
- Most urgent interfaces relate to CF design and cryostat penetrations - more on this status during interfaces breakout session
- Jack Fowler is strengthening leadership and coordination
- Developing FS CAD process document from March workshop notes
  - Will lead to detailed procedures
  - Need to have CAD requirements understood to start final design work with Arup
  - Provides for periodic CAD integration updates

# LBNF coordination with FRA oversight of DOE funding for SURF Operations

- Continuing DOE funding for SURF operations via Fermilab in “SURF Services Transition Contract.”
- Multi-year “SURF Services Contract” subcontract is being finalized and expected to be submitted for DOE review/approval in mid-July 2017.
- Coordinated work by LBNF, Fermilab ESH, and SURF on equivalent training
  - Identified training needed at both sites and compared existing training programs
  - Concurred on equivalency and now documenting this for use by employees moving between the sites
- LBNF/DUNE ESH Manager working with Fermilab ESH on coordinated incident reporting for the Project and SURF through the DOE CAIRS system

# Current Risks related to LBNF Far Site

Risk Rank	RI-ID	Title	Probability	Mean Cost Impact (k\$)*P	Mean Schedule Impact (months) * p	Changes last 6 months
3 (H)	RT-131-CFFS-4850L-018	CF FS -- escalation rate greater than predicted	50%	4,906	0.0	revisited escalation analysis; changed frm 2-pt to 3-pt estimate; high value same
3 (H)	RT-131-CR-103	LAr market risk	50%	2,200	2.3	no changes, but working on incorporating info from recent vendor visits & upcoming RFI responses
3 (H)	RT-131-CFFS-4850L-010	Specialized construction labor is unavailable	40%	1,200	1.6	
3 (H)	RT-131-CR-100	Fermilab has insufficient labor for specialized cryogenic engineering	50%	250	2.3	
3 (H)	RT-131-CR-119	Cryostat Design delays due to lack of requirements input	50%	0	3.2	approved to register
3 (H)	RT-131-PM-013	Changes to the DOE funding profile before CD-2	75%	0	4.0	no change - realizing this risk now (again)
2 (M)	RT-131-CFFS-4850L-001	Adverse conditions in far site underground excavations - Low Prob High Impact	5%	1,500	0.2	
2 (M)	RT-131-CFFS-4850L-1000	Cryogenics or FD changes impact layout/design of Far Site facilities	20%	282	0.6	
2 (M)	RT-131-CFFS-4850L-101	Adverse conditions in far site underground excavations - High Prob Low Impact	15%	76	0.2	
2 (M)	RT-131-CFFS-4850L-202	Oro Hondo shaft ventilation path is blocked	1%	250	0.1	updated mitigations based on recent SURF survey activity
2 (M)	RT-131-CR-106	LN2 System: Efficiency of delivering materials and working underground is underestimated.	20%	550	0.8	
2 (M)	RT-131-CR-117	Need to remove LAr during cryostat filling process when it is <25% full	10%	500	0.4	
2 (M)	RT-131-CR-118	Not being able to hire a company to do the Final Design of the cryogenic system	90%	0	2.7	no change - working on executing design/fab/install contract to mitigate
2 (M)	RT-131-CR-120	Need to remove LAr during cryostat filling process when it is >25% full	10%	63	1.3	
2 (M)	RT-131-PM-100	Multiple-party interfaces at SURF	20%	693	0.6	
2 (M)	RT-131-PM-101	Scope is missing due to poor interface definition at Far Site	15%	200	0.5	
2 (M)	RT-131-PM-107	Installation of cryogenics or detector overlaps with excavation work	15%	375	0.5	



## Summary

- FSCF design progress ready for CM/GC award to execute Pre-excavation scope with several important construction preparation activities underway.
- Final design start and CM/GC award await contract approvals and FY17 funding allocation
- Cryo activities continue to support protoDUNE work at CERN and learn from those activities for LBNF.
- FS interfaces are being managed with near-term focus on CF and cryostat
- Standard processes for working at SURF are being developed
- We are well-positioned to start initial construction and move into full design in coming months.