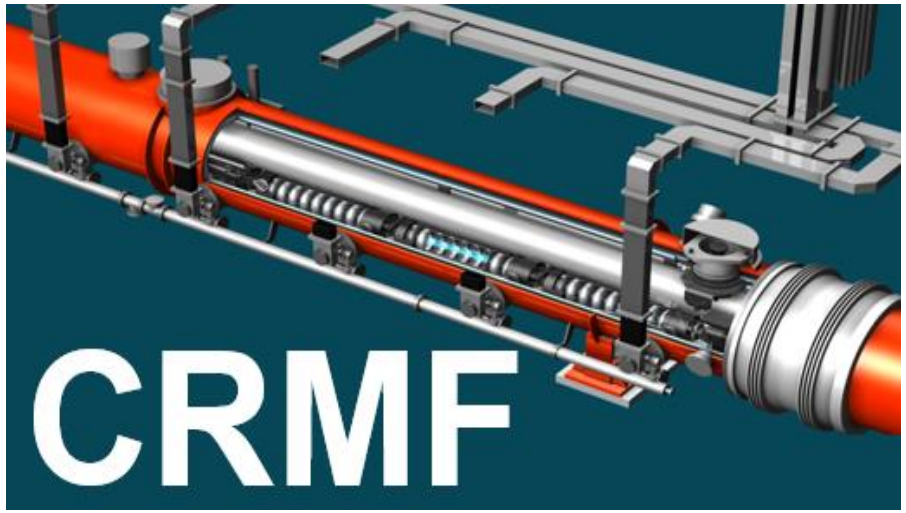


Conventional Infrastructure: Building Design and Construction

CRMF Industry Day

Paul Abdallah | Conventional Infrastructure System Manager

January 30, 2025

Outline

- Scope of Conventional Infrastructure
- Conventional Building – SLAC Site Reference
- Design Development: Details and Status
- Assumptions and Off-Project Dependencies
- Construction Planning
- Look Ahead Schedule
- Quality Assurance

Conventional Infrastructure: Scope of Work

Design and Construction of the Cryomodule Repair and Testing Facility: Design-Bid-Build

- Technical Requirements: Cryomodule Handling, Assembly and Testing
- Meets DOE and SLAC - BIO (CA) building standards:
  - Meet Accessibility and High-Performance Sustainability (HPSB)
- Maintains flexibility for future expansion:
  - Site prepared for 25K GSF Building (3700 GSF addition)
  - Utility System sized to full build-out and support future Tech Equip

Rendering 21,743 GSF – Southwest View

Collaboration with A/E: HDR: (Greg Hadsell; Scott Brady)

- Partnership with HDR from Conceptual Design through Detailed Design
- Completed optimization studies for Facility Size and Equipment Layout
- Architecture and Engineering: Sandis: Civil; R+C: Geotech/Structural; IPS: M.E.P.
  - Prepare Issue for Bid (IFB) Construction Request For Proposal

CRMF Site Location @ SLAC Campus

Scope: 21,743 GSF Conventional Building - Key Design Aspects

Rendering Northeast View

Rendering: Southeast View

- Site Development - Utilities, Access, Foundation:
  - Green Field Building Site
  - Central Utility Plant (CUP): M.E.P. Equipment and Utilities designed to support future expansion
  - Perimeter Roadway and Entry access for Cryomodule (CM) delivery; and support M&O
  - Geotech Study - Foundation: Elevated concrete floor supported from drilled piers
  - Structural Steel – Braced Frame structure

- High Performance Sustainable Design
  - Insulated metal exterior wall panel system
  - Insulated Membrane Roof – Supports future PV Panels

CRMF Building Sizes: Design Options

Rendering ~21K GSF Building: Basis of Construction Proposal

- Optimal Size: Supports full operations
- Allows space for Future Gun Shield Enclosure
- Basis of Final RFP

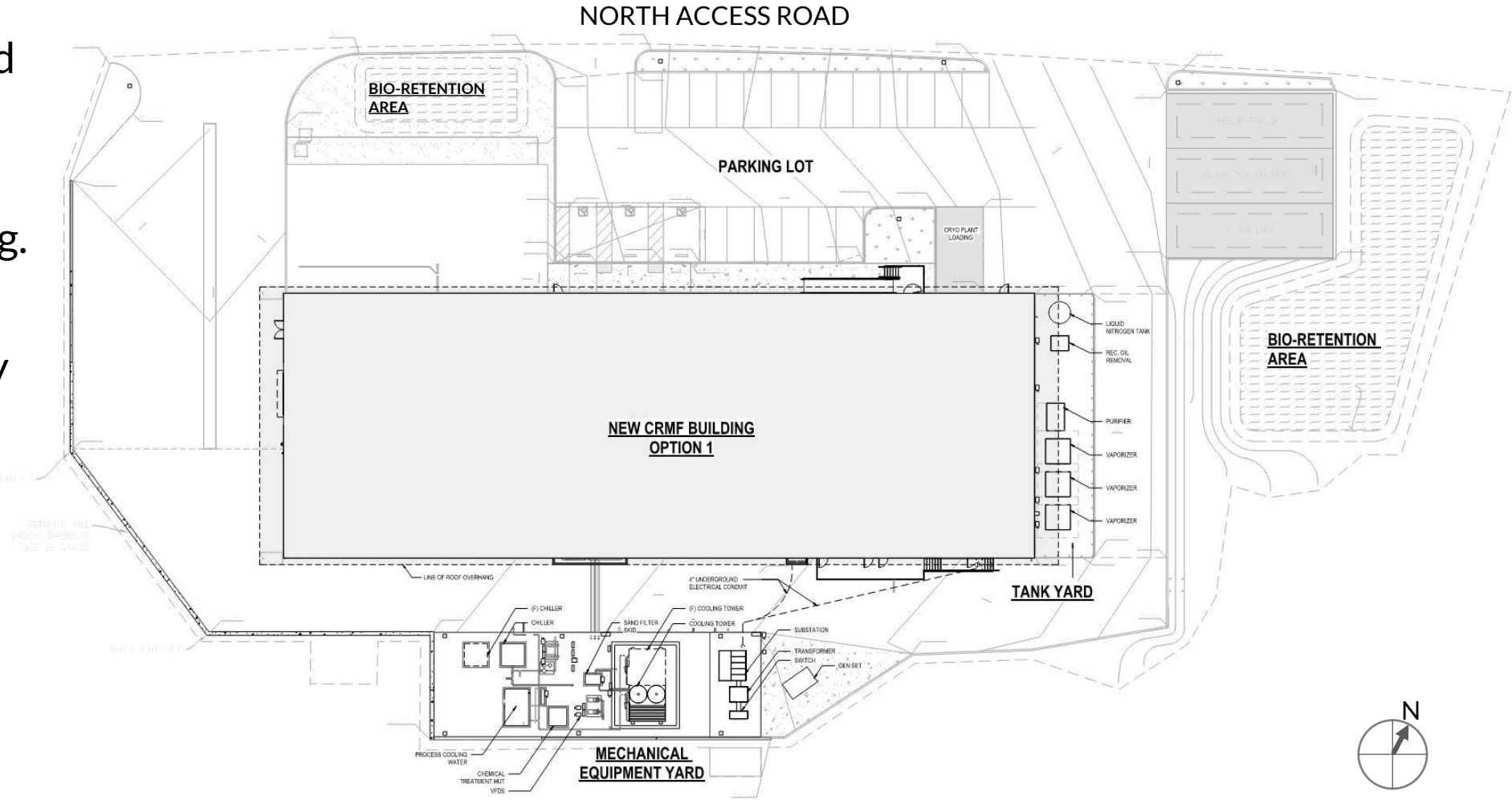
Rendering ~18,068 GSF Building:

- Option was included in draft RFP
- Not included in final RFP

25K GSF Design – Potential Future Expansion

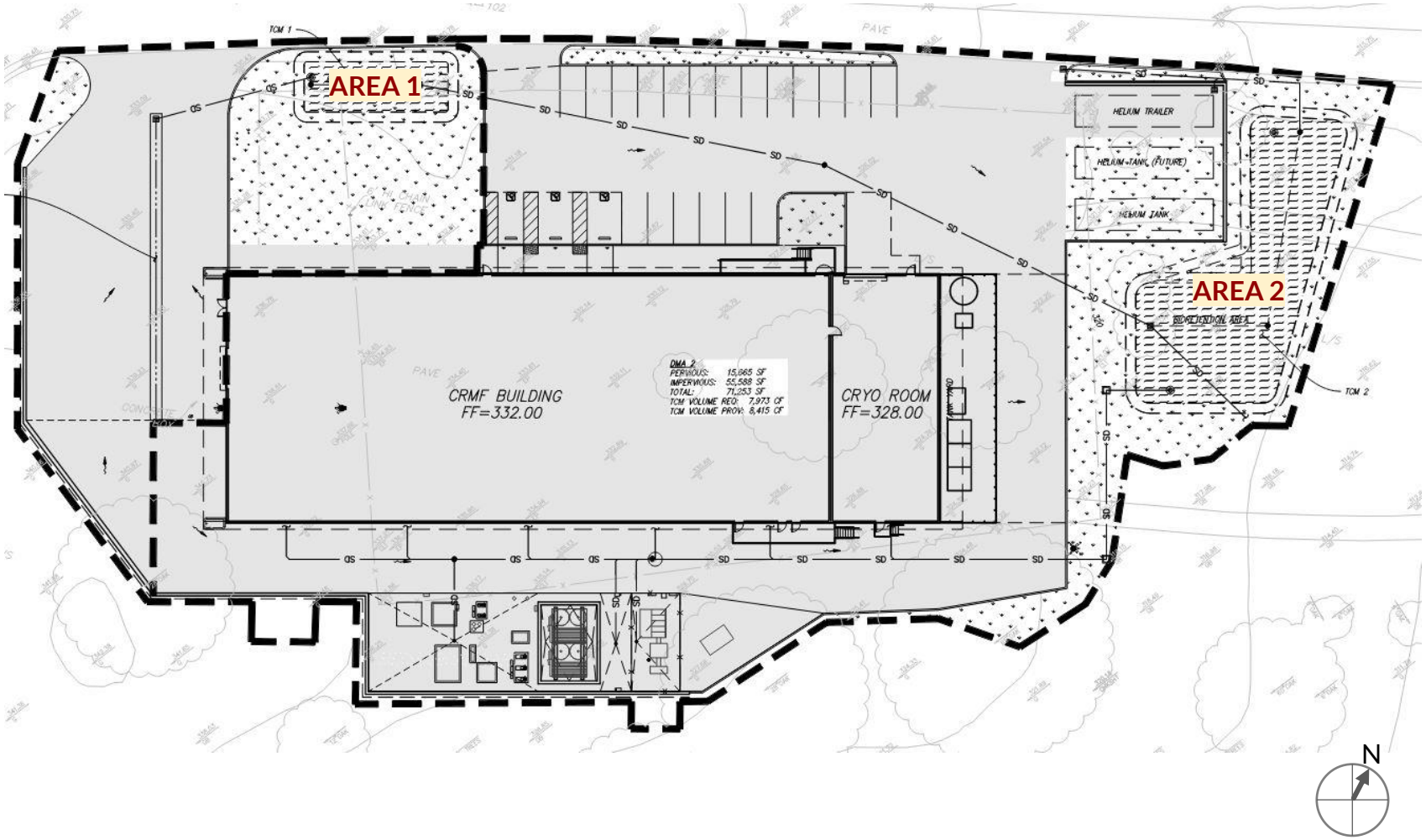
Requirements incorporated into Site Design

- Central Utility Plant (CUP): mechanical and electrical equipment yard.
- Bio-retention planning.
- Ensure perimeter site access for: Emergency Vehicle, Cryomodule, Maintenance, and delivery trucks.



Civil - Stormwater Management

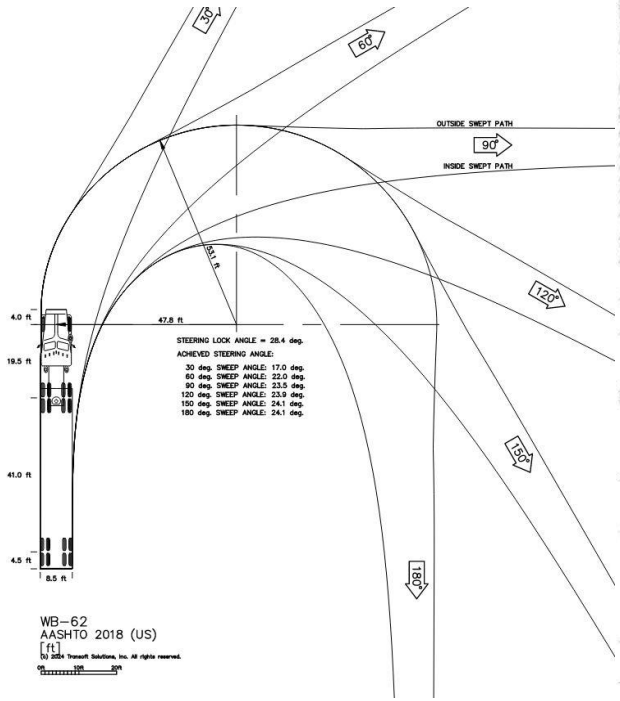
- Stormwater treatment design has been updated.
- Treatment Area 1: at the Northwest corner, 874 sqft
- Treatment Area 2: to the East, 3,782 sqft
- Complies with EISA #438

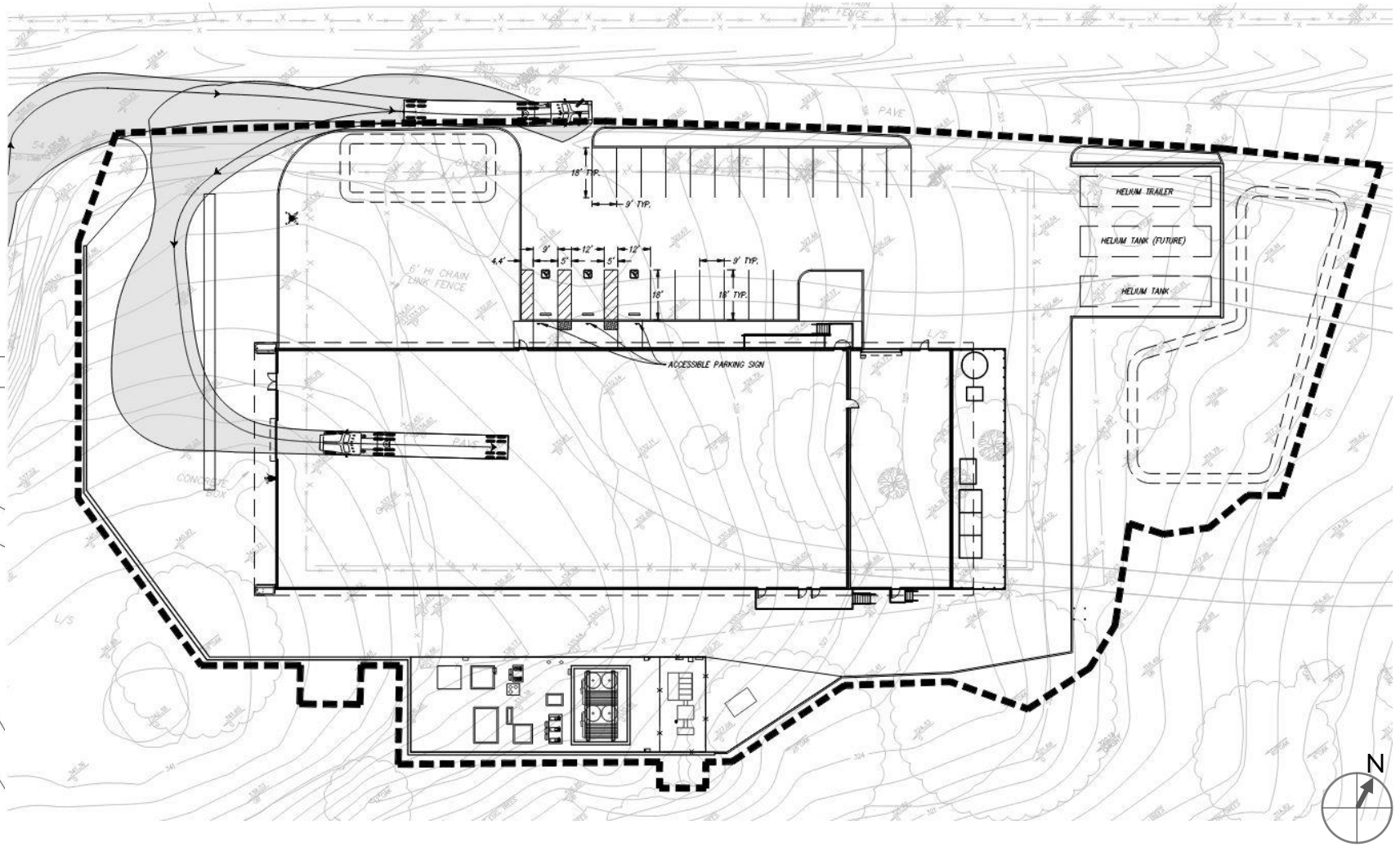


Stormwater Management Plan Revised to Reflect New Site Design

Civil - Cryomodule Delivery

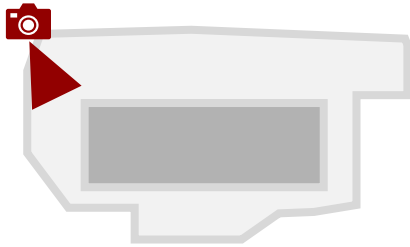
- Site plan shows cryomodule delivery truck path, with WB-62 truck.





Site Design – Entry for Cryomodule and Materials Deliveries

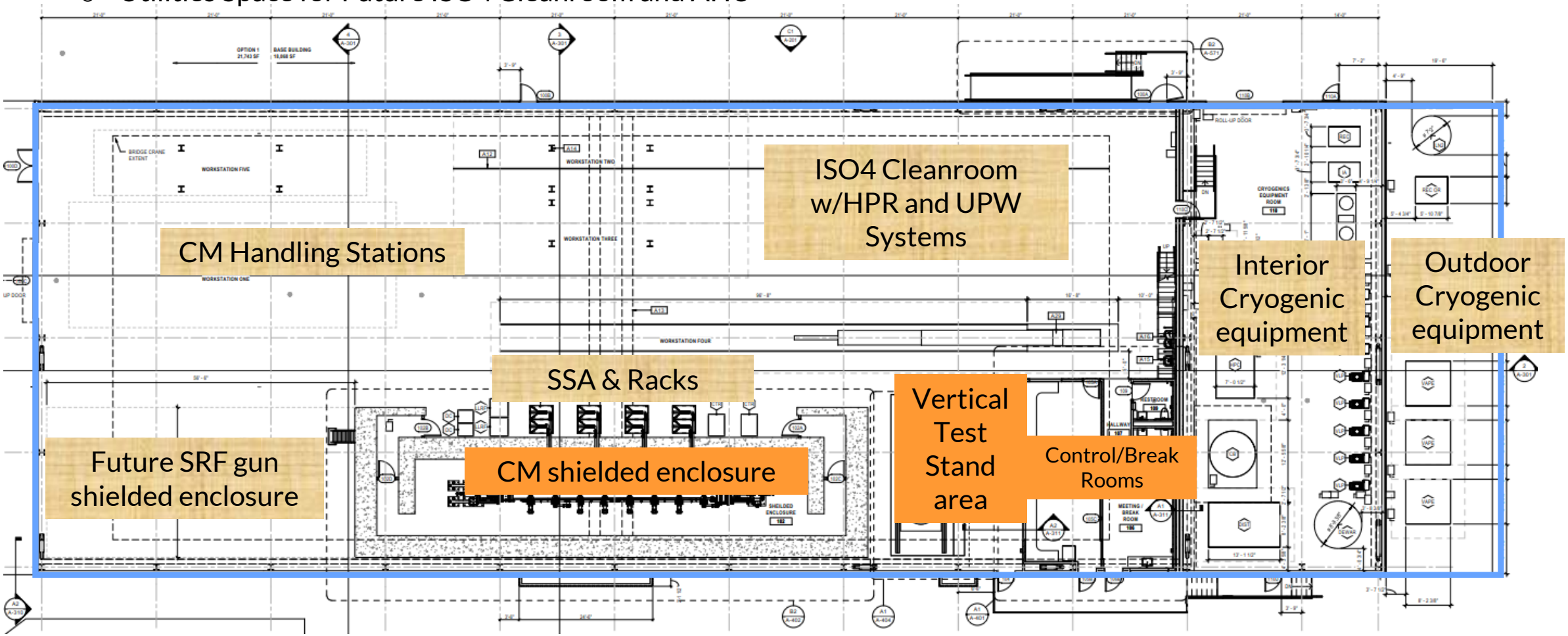
- West access road designed for Cryomodule trucks
- Large roll-up entry door accommodates full truck access into building and large equipment/materials



Rendering View from Northwest

Conventional Building: Supports all Technical Testing

- Building Interior - Supports CM Handling and Testing
  - Shielded Concrete Enclosure; Accommodates CM workstations; Control Room; and VTS Infrastructure
  - Utilities Space for Future ISO4 Cleanroom and AHU

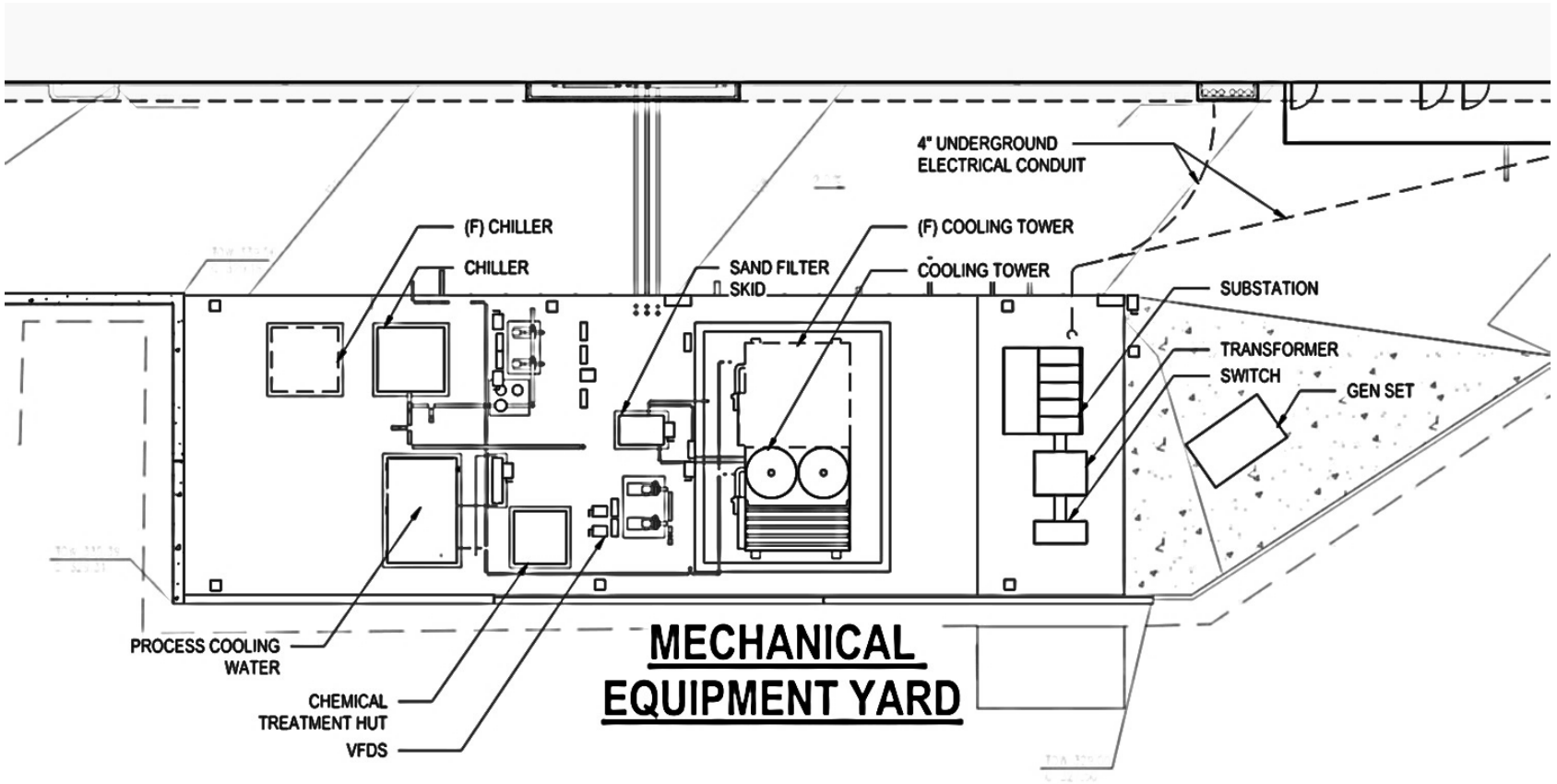


Denotes Part of Base Building Scope

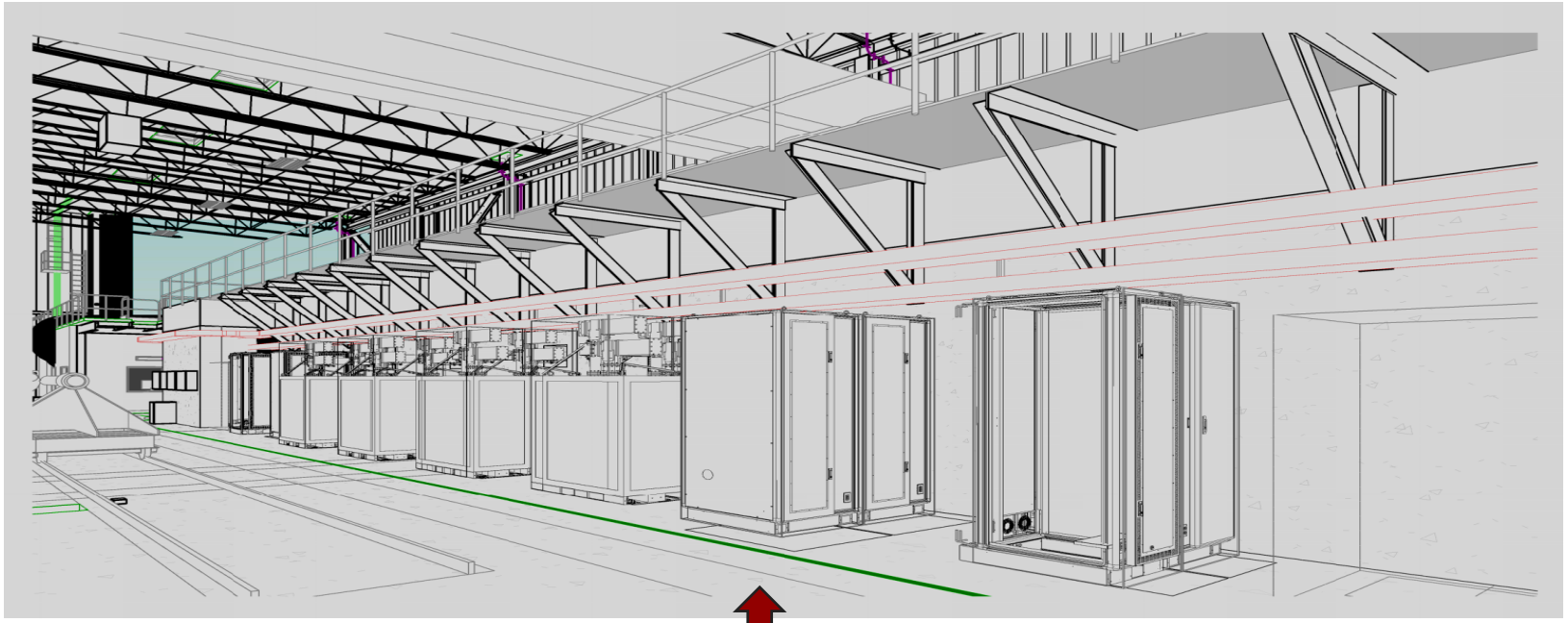
Floor Plan 21,743 GSF

Site Design - Equipment Yard

- Utility infrastructure designed to meet future 25K GSF full building.
- Cooling Tower Water and PCW Systems sized to meet Cryo and RF Equipment Requirements
- Chiller to support future Cleanroom HVAC System
- Space for Redundant CT and Chiller.
- Designated space for E-Power: emergency generator and transfer switch connections (Future permanent Generator)
- 12.47kV Substation (SLAC supply to GC for installation)

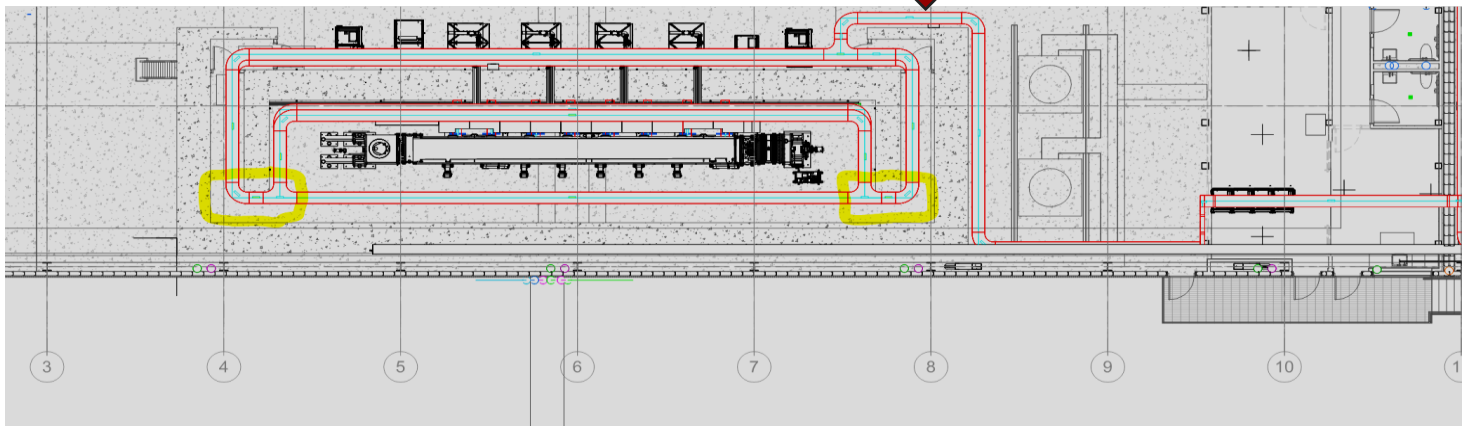


Building Modeling: Conventional Utilities and Technical Systems (Not Part of Construction)



HDR Model: Cable Tray Layout: Shown for Reference only – Not Part of Construction

CRMF Cable Tray Layout: Plan View at Shield Enclosure Area



Off-Project Scope: SLAC Site Restoration

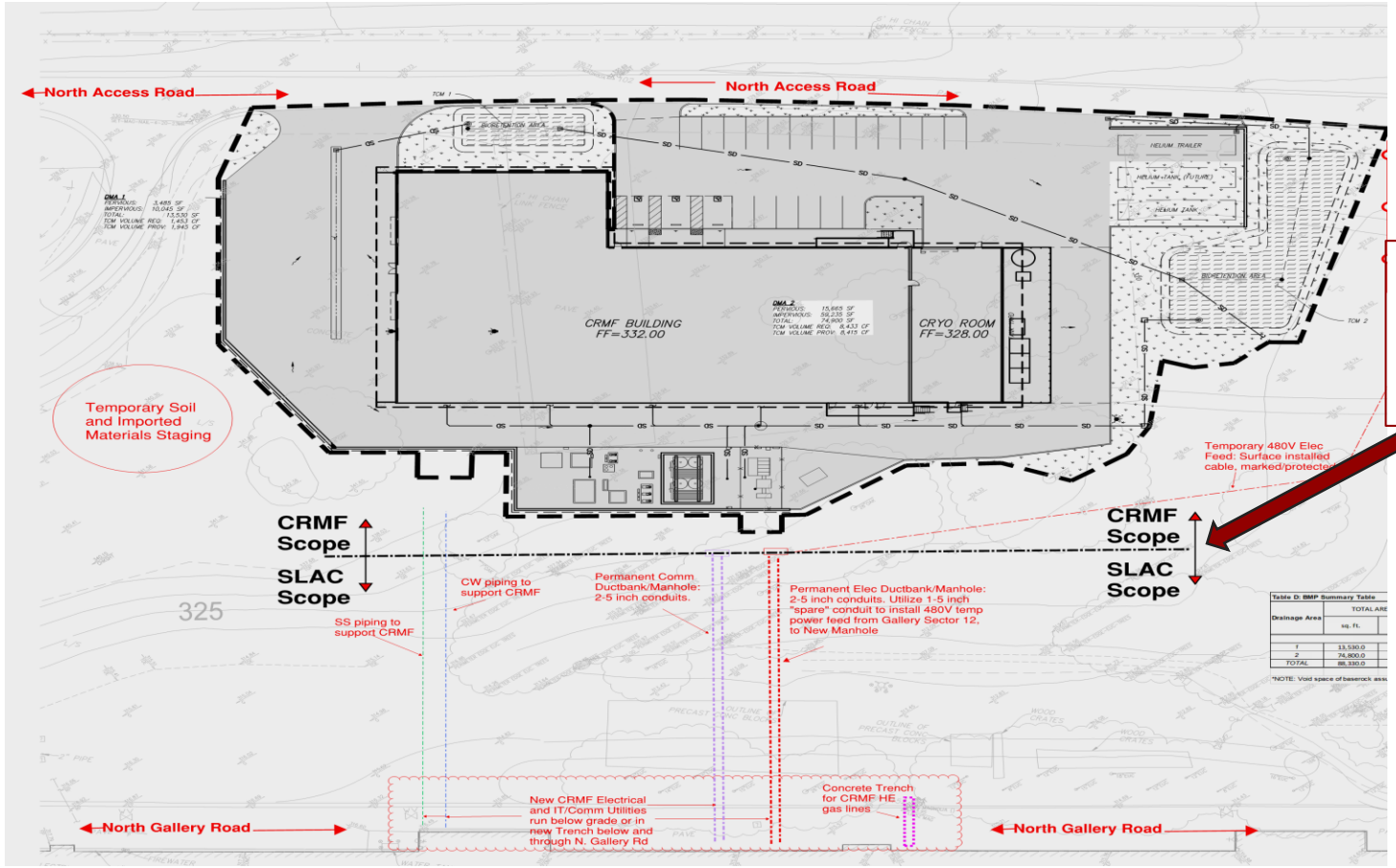
- SLAC will complete Sector 11 Site Restoration prior to turnover to construction:
  - Remove stored materials; Remove trees
  - Rough Grade and Temporary Stabilization

2023 View of Sector 11 Site: SLAC Material Staging/Storage

2025 Sector 11 Site: Current View with Equipment Removed

Off-Project Scope: Utility Improvements and GFE

- <u>SLAC will complete installation of Utilities prior to construction:</u>
  - Civil underground utilities: CW/FW, SS
  - Electrical Utilities 12.47kV Elec (Duct bank/MH &Feeders)
  - Supply the Electrical Substation -12.47kV to 480V Switch and Transformer
  - Comm/IT duct bank and manhole: Fiber run to building



Utility points of connection (Hand-off to CRMF)

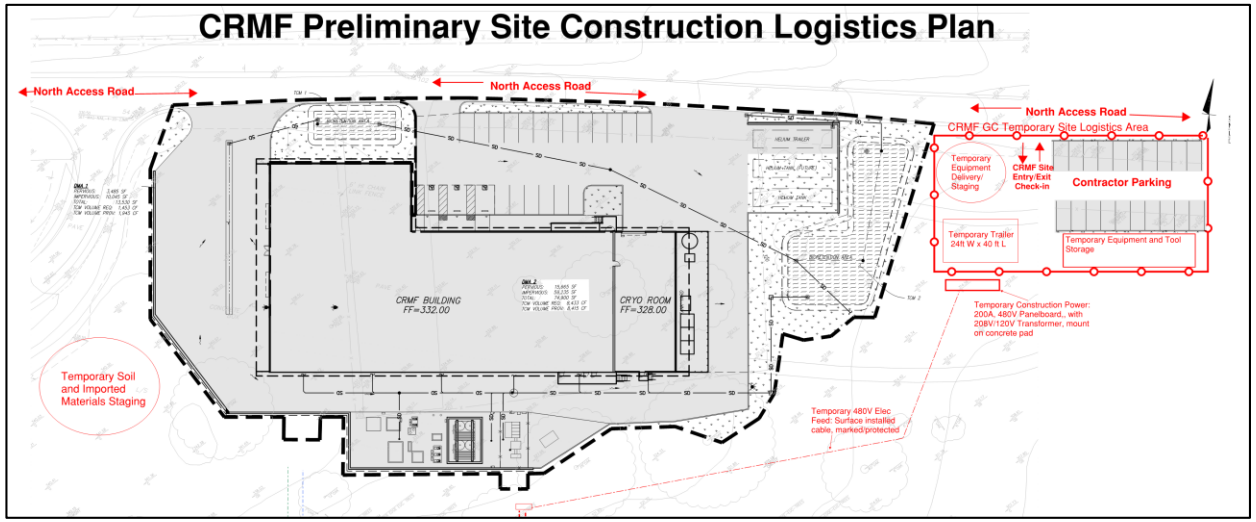
Preliminary Construction Planning: Support Future GC

Construction Site Logistics:

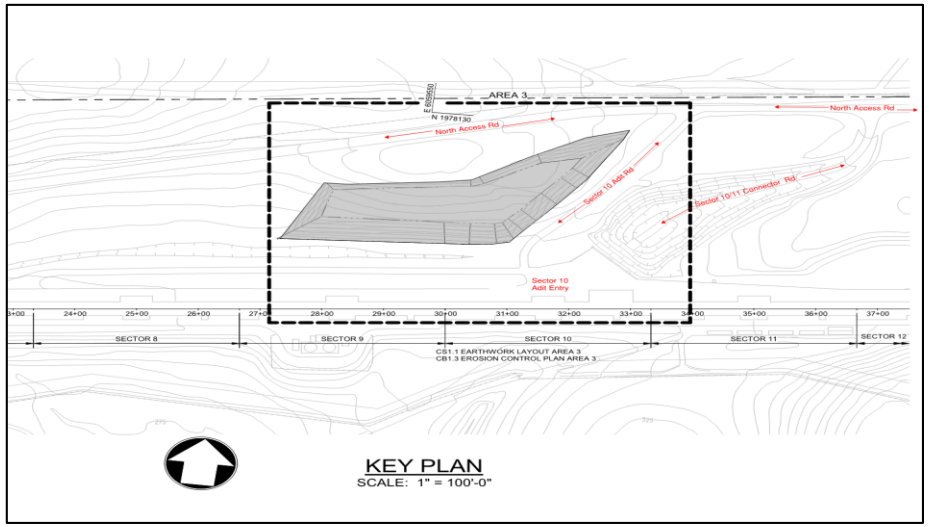
- Contractor Trailer, Parking, Laydown & Staging
  - Temporary Power: 480V Panel for Contractor
  - Temporary Power Distribution to site by Contractor

Excess Soil Management:

- Clean Excess Spoils move to Stockpile Area: Sector 9
- Site Soils: GC Management Plan: SWPPP & BMP's



Construction Planning: Trailer, Parking, Laydown



SLAC Approved Soil Stockpile at Sector 9

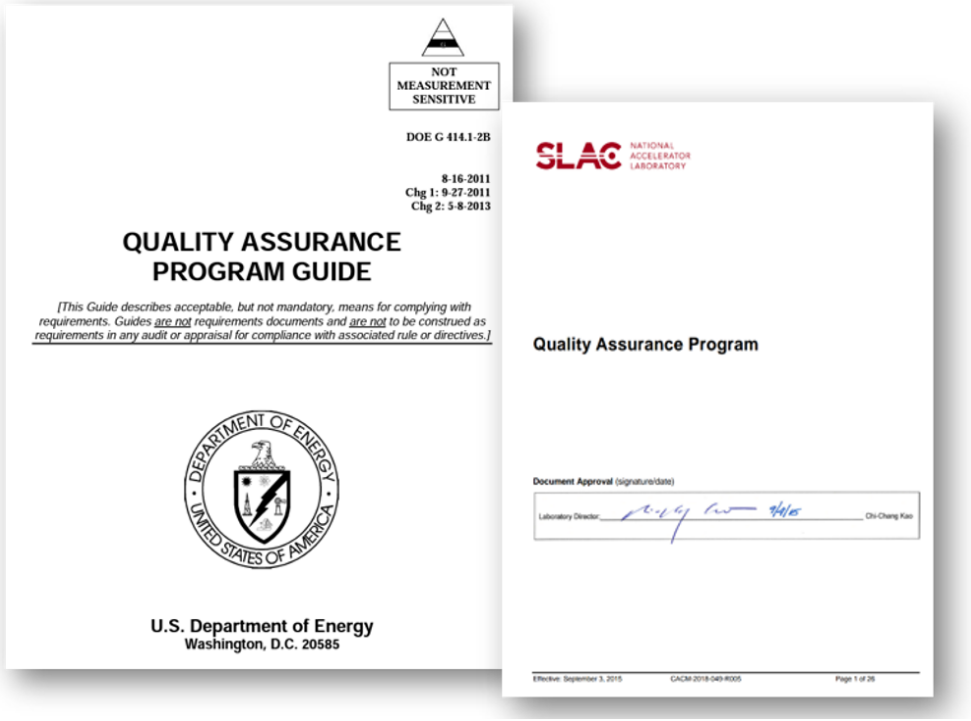
Early Planning to address the coordination of GC Construction with ongoing SLAC Projects

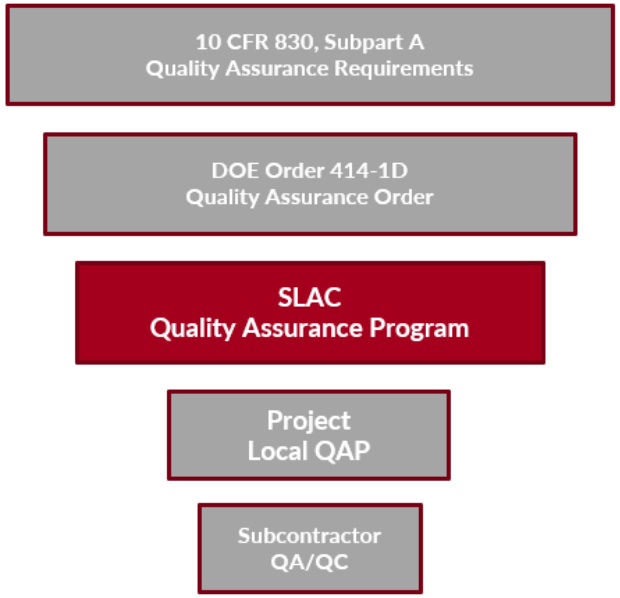
Conventional Infrastructure: Look Ahead Schedule

Milestone	Date	Notes
Complete Design - BIO Approval IFB Documents	April 2025	Final Construction SOW to Procurement
SLAC Complete Site Restoration	May 2025	Materials removal, rough grading, stabilize
Request for Proposal (RFP) Issued to GC's	June 2025	DOE and Procurement Approve RFP
GC Bid Preparation and Submit	July 2025	Fixed Price Proposal (180day Proposal)
Bid Evaluations/Interviews	Aug/Sept 2025	Contract Proposals reviewed and ranking
SLAC Support Utility Installations	Sept - Jan 2025	Underground work complete prior to CRMF start
Award Construction Subcontract	November 2025	DOE and SLAC Procurement Approvals
GC Construction: Mobilization through Beneficial Occupancy	Dec 2025 - May 2027	18-month Construction Duration
Cryogenic Equipment Room – Co-Occupancy	January 2027	Start of Cryo installation of large equipment

Project Quality Assurance (QA) – High Level Considerations

- DOE O 414.1D QUALITY ASSURANCE and SLAC Quality Assurance Plan provides guidance for CRMF
  - CRMF-1.1-PM-005, *CRMF Quality Assurance Plan (QAP)*
  - Appropriate QA requirements will flow through the contractual documents





DOE and CRMF Quality Assurance requirements flow through the Contract

Project Quality Assurance (QA) – High Level Considerations

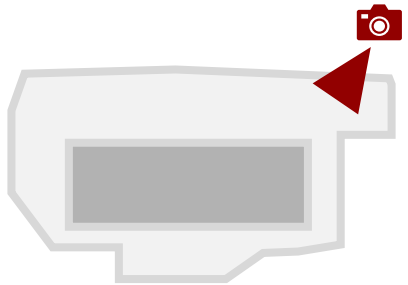
- Construction Management and Construction Quality Control
  - Contractor and SLAC Construction Manager interfaces directly for Site/Work Level QA & QC
  - CRMF Quality Assurance Manager provides an escalation process for quality related issues

- General Contractor Quality Management System Considerations:
  - Contractor maintains a Contractor Quality Management System (QMS) compliant with Industry Standards
  - Contractor's Quality Management System "Manual" will be requested (ISO 9000 or other Industry Standards – compliance vs. certification)
  - Potential Supplier Surveillance Activities
    - Verification and or Validation of products or services
    - Surveillance as requested by CRMF Management or Contractor to address Issues/Nonconformance
    - Transfer of Work process surveillance for high-risk deliverables
  - Escalation of Issues and Nonconforming Requirements pertaining to the Quality Management System

Quality Assurance Requirements flow from Regulatory and Industry Standards

Thank you!

Building rendering view towards Klystron Gallery



Aerial Rendering from
Northeast Corner

CRMF Building Site Dimensional Reference with Existing Linac

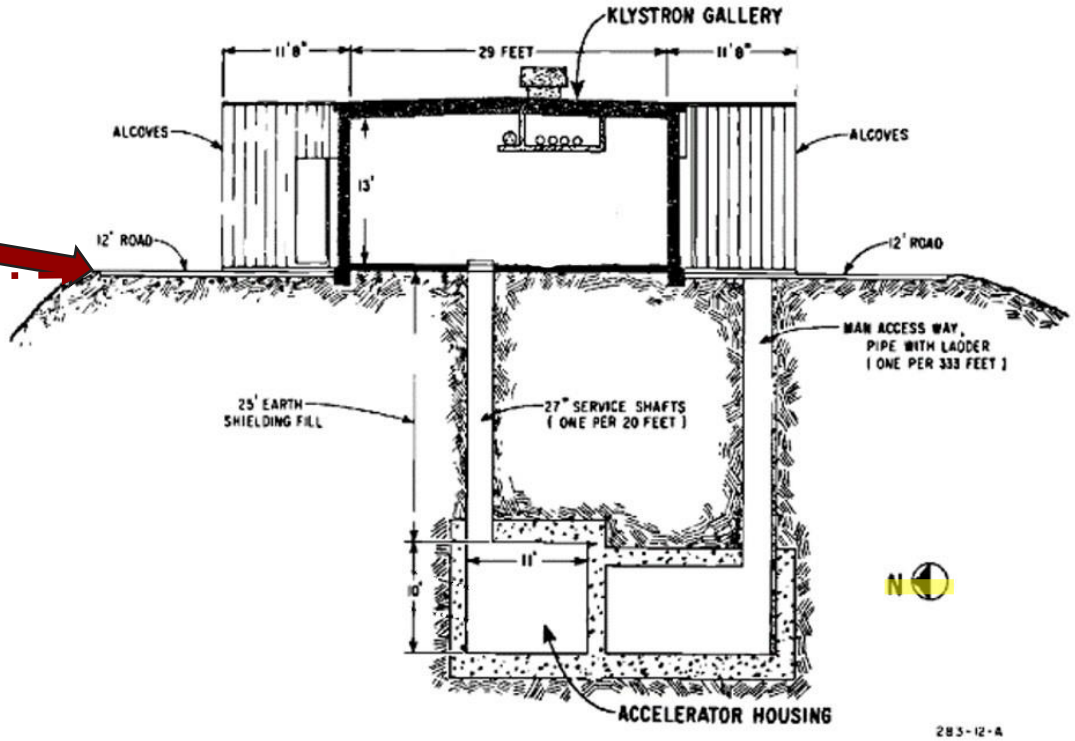
Cross Section Distance N.T.S.

Sectors 0-30 Linac Basic Dimensions (Sector = 100 m):

Klystron Gallery 29ft W x 13ft H, FF Elevation = 316 ft

Accelerator Housing: 11ft W x 10ft H, FF Elevation = 281 ft (FF Approx. 35ft below Gallery)

Cross section of accelerator housing and klystron gallery.



Conventional Facility Basic Dimensions:

Building 250ft W x 85ft W x 40 ft H (approx.)

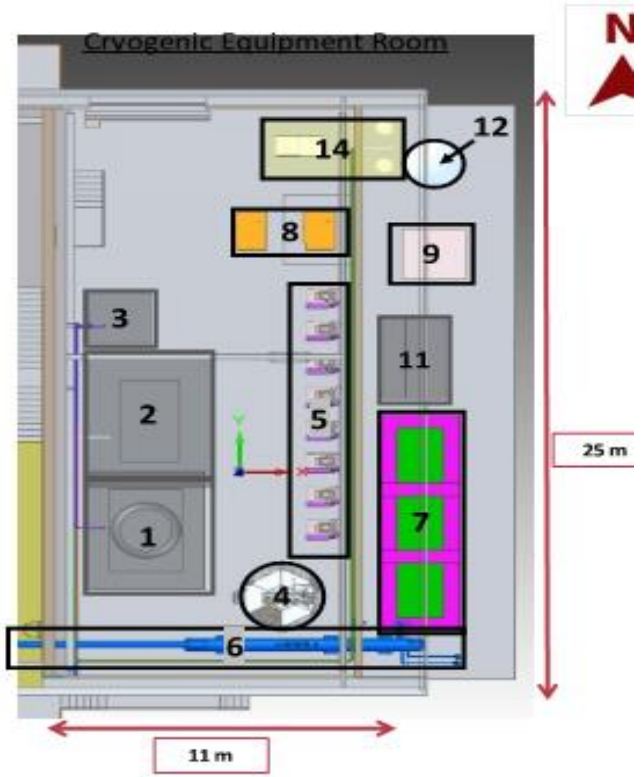
Main Assembly Area FF Elevation = 332 ft

Cryogenic Equipment Room FF Elevation = 328 ft

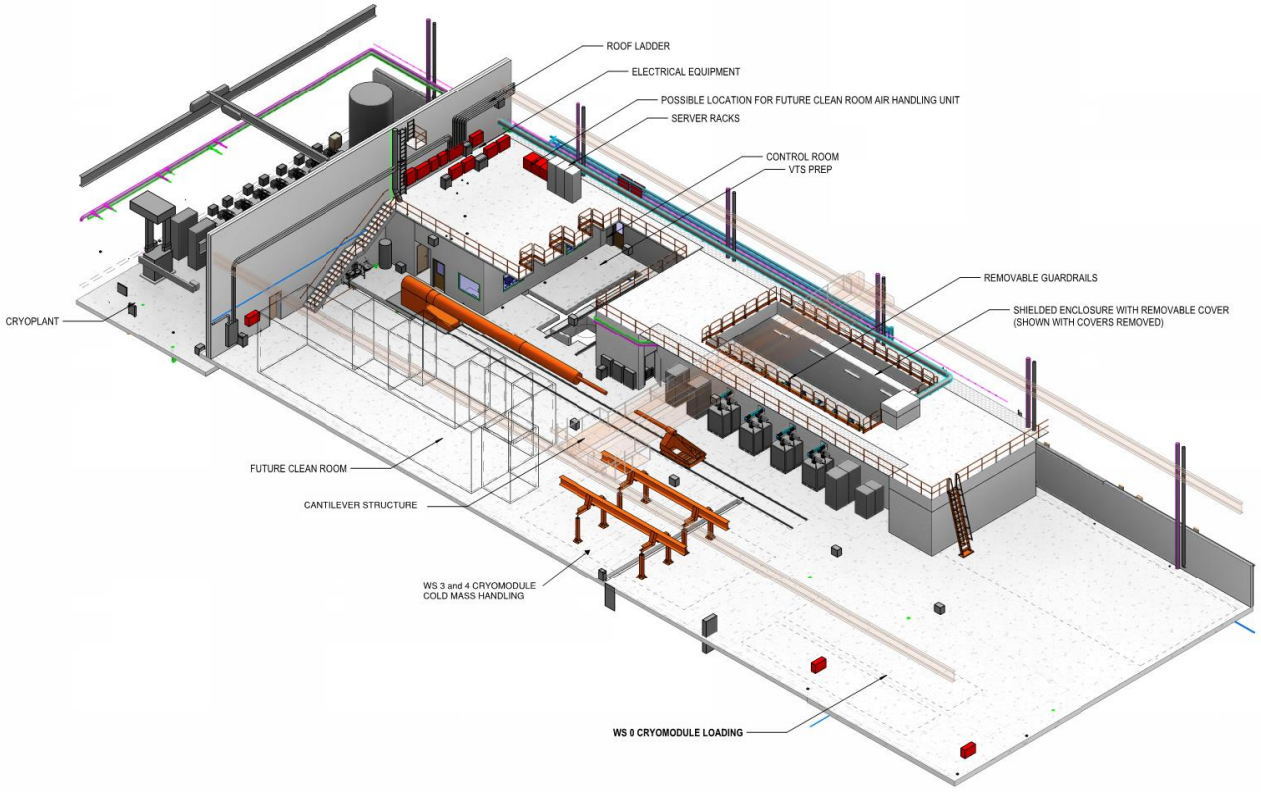
Site Design - Central Utility Plant & East Tank Yard

Rendering View from Southeast

- Central Utility Plant (CUP) M&O access
- Cryogenic Exterior (and Interior) equipment locations (RE: Engineering Note: CRMF-1.2-EN-070)



3D Modeling Incorporating Technical Work Areas



D5 BUILDING INTERIOR ISOMETRIC, NORTHWEST, 21,743 SF

Interior ISO View Main Assembly Area- 21,700 GSF Building