LCLS

Stanford Linear Accelerator Center
Stanford Synchrotron Radiation Laboratory

LCLS Room Data Sheet #	1.9-1053	X-Ray Transport Tunnel	Revision 2

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REVISION INFORMATION

Rev 2. Added layout figures No. 1 and No. 2. Deleted table with SLAC furnished equipment
Clarified exhaust requirements- "GREEN LINE" and compressed air requirements.
Added LCLS ESD 1.9-102, 1.9-103 and 1.9-104. General corrections and deletions
Updated Standards and Codes. Added power diversity factor. Clarified cable trays specifications

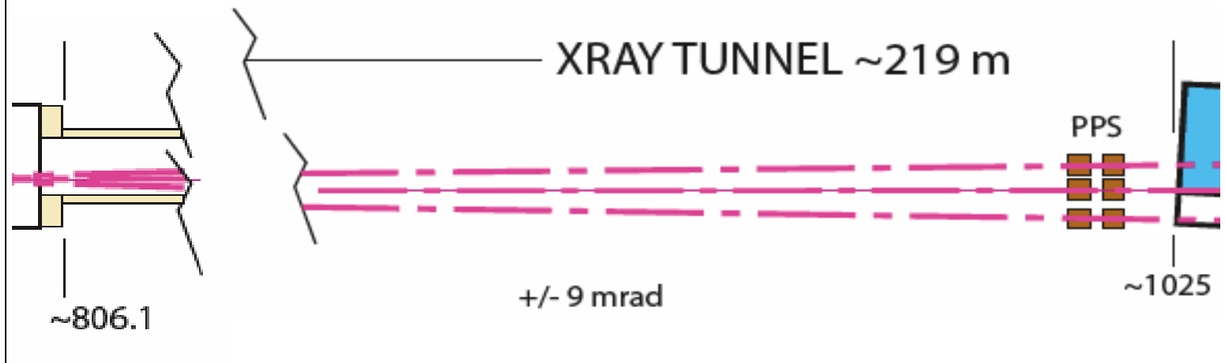
ROOM DATA SHEETS

WBS and System Manager: Richard Bionta/John Arthur

FACILITY COMPONENT	X-RAY TRANSPORT TUNNEL - ROOM DATA SHEET		
	Name of Building	LCLS X-Ray Transport Tunnel	
	Organization or Department	SLAC, Stanford University	
	Net area	1220.0 sq. meters	
	Critical dimensions	**H:** 4.5	14'-9"
		W: 3.5 to 5.0	10' to 20'
		L: 219 meters	718'-0"
	Hours of operation	Facility is locked 24/7/365 (periodic maintenance only)	
	Users/Occupancy	No occupancy throughout the year	
	Building orientation	The X-Ray Tunnel is located between the two experimental halls. It starts at the end of the NEH and ends at the start of the FEH.	
FUNCTIONAL OBJECTIVE	This tunnel transports the X-Ray beam from the NEH to the FEH. The beam emerging from the NEH is split into three beams. The primary beam travels straight through the tunnel, whereas the secondary beams are each split at +/- 9 mrad from the primary beam. All there three beams terminate within the hutches housed inside the FEH.		
PLANNING CONSIDERATIONS & CRITICAL FACTORS	Floor level is to remain constant throughout the entire length LCLS at - **247'-3"**. Refer to LCLS ESD 1.9-102 and 1.9-103 specifications. The tunnel cross-section is envisioned to be horse-shoe shaped. These need to be constructed out of reinforced gunite walls for initial and final lining. Provision also for heavy-duty Unistrut system on the walls.		
FINISHES	Wall	Reinforced concrete, white -Refer to LCLS General Concrete Guideline- ESD 1.9-103	
	Ceiling	Reinforced concrete, white -Refer to LCLS General Concrete Guideline- ESD 1.9-103	
	Floor	Concrete slab, floor surface resistant to Liquid Nitrogen spills. Refer to LCLS General Concrete Guideline- ESD 1.9-103 and to LCLS ESD Generic Accelerator Tunnel Construction Tolerance, ESD-1.9-102	
	Base	None	
	Doors	See NEH and FEH overall layout	
	Fenestrations	None	
	Acoustical	None	
APPLICABLE STANDARDS	29 CFR Part 1910 Occupational Safety and Health Standards Dept of Labor, 29 CFR Part 1926 Safety and Health Regulations for Constructions Dept of Labor, Uniform Building Code (UBC) 1997 including appendixes, National Electric Code (NEC) 2002, Uniform Mechanical Code (UMC) 2003 including appendixes, Uniform Plumbing Code (UPC) 2003 including appendixes, Uniform Fire Code (UFC) 2003 including appendixes, California Code of Regulations Title 8 Industrial Safety, Title 19 Public Safety, NFPA 70 National Fire Codes, National electrical Safety Code ANSI C2, Occupational Safety and Health Act (OSHA), General Services Administration 41 CFR part 101-19, Environmental Protection Agency 40 CFR Parts 264 and 265, SLAC Environmental Safety & Health Manual, General Industrial Activities Storm Water Permit (SLAC Permit), NFPA 101 life Safety Code, Title 24-Energy Code, DOE standard 10 CFR Part 435, ASHRAE/IES Standards 90.1, NFPA Standard 13 and SLAC Fire Marshal requirements, LCLS Cabling Standard and SLAC LOTO		

VIEWS & SCHEMATICS (N. T. S.)

Figure No. 1



MECHANICAL REQUIREMENTS	**HVAC**	☐	Heating system	Temp:	☐	Mechanical humidification
		☐	Air conditioning	Temp:	☒	Direct exhaust system
		☐	Direct supply		☐	Positive pressure system
		☐	Indirect supply		☐	Negative pressure system
		☐	Smoke control system		☐	Standard registers
		☐	Temperature sensors connected to SLAC's DDC system		☒	Requirement for gases
		List of Gases - a) Provide clean dry oil-free compressed air 10 SCFM/each outlet, 100 psig. Provide one outlet every ~140 ft (on south wall) with shut-off valve and pressure gauge. One outlet at the beginning of the X-Ray Tunnel and then equally space along the length of the tunnel. Refer to Figure No. 2			a) Mech pump exhaust line. Provide five (5) exhaust duct connections along the entire length of the tunnel. Total: 350 CFM. Refer to Figure No. 2	
	Communications	☒	Telephone- Two lines at each location		☐	PA speakers
		☒	Dataport- 2 outlets-per location		☐	PA station
		☐	Payphone		☐	CCTV camera
		☒	Fire alarm station		☐	CCTV monitor
		☐	Intercom			
		Comments: a) Telephone (two lines per location) and data ports (two outlets per each location) are required. Provide every 100 feet along the length of the tunnel. b) Two 24" wide cable trays, install horizontally and stacked vertically. Cable trays shall be 6" deep for I&C cables and control cables for DC racks, and 4" deep for high voltage cables for DC racks. Install cable trays on wall at 7.5 feet AFF. c) Cable trays shall be made of galvanized steel, provide each cable tray with 1 # 4/0 bare copper wire for grounding. d) Racks will be furnished and installed by SLAC				
	Plumbing/Fire Protection	☐	Hot water system		☐	Electric water cooler
		☐	Cold water system		☐	Drinking fountain
		☐	Tempered water		☒	Smoke detection system
		☐	Waste drain		☒	Wet Sprinkler System
		☐	Floor drain		☐	Eye wash
		☐	Trench drain			
		Comments: a) Cooling water (LCW) lines for turbo and/or Ion pumps or equivalent required with a capacity of 3 gal/min, header located at upstream end.				
ELECTRICAL REQUIREMENTS	**Power supply**	☐	120V outlets non-secure		☐	Uninterrupted power supply
		☒	120V outlets, 1 ph, 20 amps-See fig No.2		☒	Special electric Type:
		☐	Emergency power			See comments
		Comments: Refer to Figure No. 2 for locations a) Provide six (6) panels, 120-208 volts, 3 ph three for "clean" and thee for "dirty" power at three locations along the tunnel (north wall). Panel capacity: 42 circuits/each. Each panel shall have a main breaker with a minimum capacity of 100 amps. Diversity factor: 70 %. Locate on north wall. b) Provide power for Multi-Outlet Box: 208Y/120 volt 60 Amps to be installed on wall. MOB should be located one every 240 feet. Layout evenly along the length of the tunnel. Provide power from Utility panel. c) Provide three (3) welding outlets, 480 volts, 3 phase, 100 amps., equally spaced along the length of the tunnel (locate on north wall)				
	Lighting	☒	Light fixtures		☐	Remote lighting control
		☐	Fixture type I: Down light		☒	Light switches
		☐	Fixture type II: Bollard (exterior)		☒	Lighting level **FC: 30**
		☒	Emergency lighting			
		Comments: a) Fixtures to be surface mounted fluorescent, low profile. b) Refer to LCLS ESD Emergency Lighting Specification, ESD-1.9-104				

RADIATION/SEISMIC/VIBRATIONS ISSUES	**Comments:** **1)** Attention needs to be given to the issue of settlement as the natural depth of the cover (above) increases throughout the tunnel profile. 2) See AE Design Guidelines for Radiation and Seismic requirements.	
SPECIAL REQUIREMENTS FOR EQUIPMENT	**Comments:**	
ENVIRONMENTAL NEEDS	1.0	Radiation protection is a must for surrounding facilities.
LIST OF SPECIAL EQUIPMENT		

Figure No. 2