WBS NUMBER					TITLE	DESCRIPTION
1	2	3	4	5		
1	**01**				LCLS PROJECT MGMT, PLANNING & ADMN (TEC)	This summary WBS covers the project management, planning and organization function of the PED and construction phases (TEC) of the LCLS Project.
1	**01**	**01**			Environment, Safety & Health	This summary WBS describes the ES&H support for the LCLS project at SLAC.
1	**01**	**01**	**01**		Radiation Physics	This WBS supports radiation physics experts/consultants responsible for specifying permissible radiation levels for the LCLS enclosures, interfacing with conventional facilities personnel on the details of labyrinths, shielding walls, permissible materials, etc., and for conducting periodic radiation safety reviews on the LCLS project.
1	**01**	**01**	**02**		ESH Management & Coordination	This WBS supports ES&H staff/consultants responsible for the LCLS Integrated Safety Management System (ISMS), specifying permissible work areas for the LCLS enclosures, interfacing with conventional facilities personnel on the details of labyrinths, shielding walls, permissible materials, etc., and for conducting periodic general safety reviews and audits on the LCLS project.
1	**01**	**01**	**03**		Seismic & Engineering Support	This WBS supports seismic and engineering experts/consultants responsible for determining the permissible seismic and/or engineering specifications for enclosures and for conducting periodic general seismic and engineering reviews on the LCLS project.
1	**01**	**02**			Project Management	This summary WBS describes the project management function for the LCLS project at SLAC.
1	**01**	**02**	**01**		SLAC Project Management Office	This summary WBS describes the LCLS Project Office at SLAC.
1	**01**	**02**	**01**	**01**	SLAC Project Office - General	This WBS provides for the management function of the LCLS Project Office, which includes: The LCLS Project Director who is responsible for directing the overall LCLS project through design, fabrication, installation of the LCLS Project. The scope of the Project Director also includes organizing and selecting staff for the LCLS project at SLAC, ANL and LLNL, ensuring that all ES&H responsibilities and requirements are integrated into the project organization, and representing the LCLS project in interactions with the DOE and Laboratory management. The LCLS Chief Engineer who has oversight responsibility for the management and engineering activities of the LCLS project at SLAC, ANL and LLNL. The Chief Engineer also is responsible for determining the technical, cost and schedule dimensions of the project, and establishing systems to coordinate and report construction costs, schedules manpower and technical issues to the LCLS Project Director and DOE.
1	**01**	**02**	**01**	**01**	SLAC Project Office - General (Continued)	The LCLS Budget Officer who is responsible for providing monthly summaries of budgets, costs and obligations in a usable format to LCLS management. The LCLS Budget Officer also represents the LCLS project as the point for contact to SLAC, ANL, LLNL and DOE for all financial and/or auditable information. The LCLS E-Beam and Photon Beam System Managers direct and coordinate the integrated effort of their respective LCLS WBS systems, conduct Preliminary and Final Design Reviews as necessary to ensure the design in consistent with the technical requirements of the LCLS, and participate in project planning, scheduling and cost estimating for their LCLS system. The LCLS Administrative Support to the scientists, engineers, and technical staff supporting the LCLS project. The LCLS Administrative Support also provides support for financial and budgetary forecasting, procurement, and also organizes meetings, reviews, conferences, and travel.

WBS NUMBER					TITLE	DESCRIPTION
1	2	3	4	5		
1	01	02	01	02	SLAC Project Support	This WBS provides for the support function of the LCLS Project Office, which includes: The LCLS Project Management Control System (PMCS) supported by a team of professional cost/schedule analysts that will establish and maintain a PMCS to track the planning, performance and resource allocation during the LCLS construction project. Additional collective duties include maintaining the Work Breakdown Structure (WBS), tracking and maintaining the cost and schedule baseline and documenting the Baseline Change Proposal (BCP) System.). Primavera is used as the primary scheduling tool and COBRA is used for cost analysis. Website support for the LCLS project which includes maintaining the LCLS website as the primary repository of project information. The LCLS website will include a general area of information about LCLS (education, outreach, LCLS applications and future directions), technical areas for LCLS groups to disseminate information, and sensitive LCLS management information on costs, budgets, PMCS data (earned-value, change control).
1	01	02	01	02	SLAC Project Support (Continued)	The website will be functional ~100% of the time, backed up regularly, and virus-protected. Database support for the LCLS project will include maintaining the LCLS documentation database as the primary repository of database project information. The LCLS Database will collect and organize in a relational database such items as purchase req's, drawings, design specifications and control parameters. The database will be accessible via the LCLS website, functional ~100% of the time and backed up regularly. Procurement support for the LCLS project will include maintaining LCLS requisitions, purchase orders and P-card transactions. Quality assurance and quality control support for the LCLS project will include maintaining LCLS performance specifications, as-built/as-tested documentation, "travelers" and change control. Specialty software licenses necessary to support the global LCLS project. Computing support for the LCLS project staff. This includes PC and network support including troubleshooting and computer security. Recruiting/relocation support for newly hired staff to the LCLS project.
1	01	02	01	03	SLAC Project Office M&S	This WBS provides for the Materials & Supplies (M&S) for the LCLS Project Office, which includes: Miscellaneous M&S to operate the LCLS project on a day-to-day basis which includes all office supplies, binders, etc. to support the LCLS team. All M&S costs necessary to support the LCLS project during reviews (Management, Physics, Safety, Engineering, etc.) is included in this WBS. Tele/videoconferencing equipment (polycoms, monitors, phones, modems) and projector costs for the LCLS project, including setup labor. All PC + software costs for the LCLS group. Miscellaneous shipping or storage of general LCLS items at SLAC.
1	01	02	01	03	SLAC Project Office M&S (Continued)	This is not assumed to cover large shipping/storage costs associated with large LCLS deliverables (i.e., undulators, etc.). Project-related travel costs for the SLAC Project Office. Also includes travel funds for technical experts to travel at the request of the project office for project-related consultations. Building refurbishments, relocations or minor remodeling to existing SLAC buildings to meet the needs of the LCLS project staff. Project-related travel costs for technical experts to travel at the request of the project office for reviews or project-related studies or workshops.
1	01	02	01	04	SSRL Physics Support	This WBS describes support from SLAC's SSRL Division for LCLS FEL analyses and physicist input into the LCLS design such that it can support the LCLS science.

WBS NUMBER					TITLE	DESCRIPTION
1	2	3	4	5		
1	01	03			Technical Integration	This summary WBS describes the technical integration effort for the LCLS Project. These integration tasks are technical activities or tasks that support the global effort for the LCLS, such as Lasers, Controls and Alignment systems which integrate specific geographical LCLS systems into a fully functional LCLS.
1	01	03	01		Global Controls	This WBS describes the technical integration effort to support the LCLS global control system, which includes: Software programming support to provide a common software interface to hardware used across the LCLS systems. This will also support programming effort to write drivers and test hardware and support the integration of LCLS hardware with the SLAC SLC control system. Controls management and consulting effort at the global LCLS level which include a controls manager and expert consultant to produce an integrated control system for the LCLS. This requires merging a new EPIC-based control system with the existing SLAC SLC control system.
1	01	03	01		Global Controls	Refurbishments to the existing SLAC Main Control Room to support the LCLS Project. Global controls system administrator to manage all aspects of the control system software including the operating system, version control of LCLS applications and EPIC's programs. High level application programming to support the physics application and software programs for the LCLS, such as the LCLS testing, fast feedback and integration programs. LCLS beam instrumentation, controls and test equipment to support the global LCLS controls effort, which includes such items as prototype IOC's, development hardware, instrumentation, oscilloscopes, power supplies and function generators.
1	01	03	05		Global Controls NRE	This is all non-recurring development for the first instance of each subsystem solution.
1	01	03	05	01	EPICS Controls Modules	All CPUs and VME crates for commissioning.
1	01	03	05	02	LLRF Controls	Development of the first low-level RF system.
1	01	03	05	03	E-Beam Diagnostics & Controls	Development of the first E-Beam diagnostics system.
1	01	03	05	04	Laser Controls Design	Development of the laser control system.
1	01	03	05	05	Laser Heater Controls Design	Development of the laser heater system.
1	01	03	05	06	Timing Controls	Development of the LCLS timing system.
1	01	03	05	07	Vacuum Controls Infrastructure	Development of the first vacuum controls.
1	01	03	05	09	Power Supply Control	Development of the first power supply system.
1	01	03	05	10	MPS/PPS/BCS Controls	Development of the first machine protection, personnel protection and beam containment systems.
1	01	03	05	12	Global Controls NRE	Management support
1	01	03	05	13	SLC Aware IOC - PED	Design and implementation of the software to emulate the SLC micro communication inside the EPICS IOC to allow the existing high level applications on SLC to be used for early commissioning and operation.
1	01	04			Education Support	This summary WBS describes the education and outreach support for the LCLS project and LCLS scientific program.
1	01	04	01		Education/Outreach Travel	This WBS provides education/outreach travel to support the LCLS project such as presenting lectures on the scientific merits of the LCLS and promoting Free Electrons Lasers (FEL's) as scientific instruments.
1	01	04	02		Education/Outreach M&S	This WBS provides education/outreach M&S (brochures, posters, CD's, etc.) to support the LCLS project and the scientific merits of the LCLS.
2	01				LCLS PROJECT MGMT, PLANNING & ADMN (OPC)	This summary WBS covers the project management, planning and organization function of the R&D, Spares and Commissioning (OPC) phases of the LCLS Project.
2	01	01			Physics Support (OPC)	This summary WBS provides for physics support through the LCLS R&D and commissioning phases of the project.

WBS NUMBER					TITLE	DESCRIPTION
1	2	3	4	5		
2	01	01	01		SAC-MAC Physics	This WBS provides for global physics support through the LCLS R&D and commissioning phases of the project. This will provide support for the LCLS Physics Group Leader who is responsible for directing the overall physics effort for the LCLS project, and provides direction and guidance to the LCLS System Physicists to ensure that LCLS System Requirements meet the needs of the LCLS.
2	01	01	02		Injector Physics	This WBS provides support for the LCLS Injector System Physicist through the R&D and commissioning phases of the LCLS Injector System. The Injector System Physicist is responsible for directing the overall physics effort for the LCLS Injector system and for providing system requirements that satisfy the global requirements of the LCLS project.
2	01	01	03		Linac Physics	This WBS provides support for the LCLS Linac System Physicist through the R&D and commissioning phases of the LCLS Injector System. The Linac System Physicist is responsible for directing the overall physics effort for the LCLS Linac system and for providing system requirements that satisfy the global requirements of the LCLS project.
2	01	01	04		Undulator Physics	This WBS provides support for the LCLS Undulator System Physicist through the R&D and commissioning phases of the LCLS Injector System. The Undulator System Physicist is responsible for directing the overall physics effort for the LCLS Undulator system and for providing system requirements that satisfy the global requirements of the LCLS project.
2	01	01	05		X-Ray Transport Physics	This WBS provides support for the LCLS X-Ray Transport System Physicist through the R&D and commissioning phases of the LCLS X-Ray Transport System. The X-Ray Transport System Physicist is responsible for directing the overall physics effort for the LCLS X-Ray Transport system and for providing system requirements that satisfy the global requirements of the LCLS project.
2	01	01	06		X-Ray Endstations Physics	This WBS provides support for the LCLS X-Ray Endstations System Physicist through the R&D and commissioning phases of the LCLS X-Ray Endstations System. The X-Ray Endstations System Physicist is responsible for directing the overall physics effort for the LCLS X-Ray Endstations system and for providing system requirements that satisfy the global requirements of the LCLS project.
2	01	01	07		Conventional Facilities Physics	This WBS provides support for the LCLS Conventional Facilities System Physicist through the R&D and commissioning phases of the LCLS Conventional Facilities System. The Linac Conventional Facilities Physicist is responsible for directing the overall physics effort for the LCLS Conventional Facilities system and for providing system requirements that satisfy the global requirements of the LCLS project.
2	01	01	08		Consulting Physics (Collaboration)	This WBS provides for physicist support and consultation through the R&D and commissioning phases of the LCLS, such as analytic and numerical computations of the SASE process in the LCLS, optimization of the LCLS design, modeling predictions of FEL performance to support modifications for self-seeding operation of the FEL. Also, ad hoc computer modeling programs in support of the LCLS commission effort are included.
2	01	01	09		Consulting Physics (SLAC)	This WBS provides for physicist support and consultation through the R&D and commissioning phases of the LCLS, such as analytic and numerical computations of the electron beam emittance, bunch length, bunch charge, and full-length LCLS (electron to photon) simulation studies to optimize the commissioning of the LCLS are included.

WBS NUMBER					TITLE	DESCRIPTION
1	2	3	4	5		
2	01	01	10		Global Controls Physics Liaison	This WBS provides support for the LCLS Global Controls Physicist through the R&D and commissioning phases of the LCLS. The LCLS Global Controls Physicist is responsible for directing the overall physics controls effort for the LCLS and for providing control system requirements that satisfy the global requirements of the LCLS project.
2	01	01	11		Global Controls (OPC)	This is all non-recurring development for the first instance of each subsystem solution.
2	01	01	11	01	EPCIS Control Modules	All CPUs and VME crates for commissioning.
2	01	01	11	11	Global Controls Commissioning	Support machine commissioning of the control system including: test support, revisions from operational experience, and problem resolution.
2	01	01	11	12	Global Controls Management (OPC)	Management support
2	01	01	11	13	SLC Aware IOC	Design and implementation of the software to emulate the SLC micro communication inside the EPICS IOC to allow the existing high level applications on SLC to be used for early commissioning and operation.
2	01	02			R&D Studies and Prototyping	This WBS provides support for building new timing and RF boards. Both the timing boards and the RF boards require VME architecture to interface with the existing SLAC timing system and the existing SLAC klystron infrastructure.
2	01	02	01		R&D Studies and Prototyping	This WBS provides support for building new timing and RF boards. Both the timing boards and the RF boards require VME architecture to interface with the existing SLAC timing system and the existing SLAC klystron infrastructure.
2	01	03			Project Management, Planning and Administration M&S (OPC)	This summary WBS covers the Other Project Cost for the LCLS Project Office at SLAC.
2	01	03	01		SLAC Project Office - General (R&D)	This WBS covers a portion of the Project Office staff to manage and direct R&D, Spares and Pre-Operations activities.
2	01	03	02		SLAC Project Support (R&D)	This WBS covers a portion of the Project Support staff to manage and direct R&D, Spares and Pre-Operations activities.
2	01	03	03		Project Management, Planning and Admn - M&S (OPC)	This WBS covers the pre-operations activities for the LCLS, which include electrical power usage, start-up costs and Linac legacy costs during the commissioning phase of the LCLS.