LCLS Work Authorization

Part 1. Work/Project Description (To be completed by the Project Manager)

Job Title: Hydrostatic Leveling System Installation and Testing Date: July 22, 2008

Location of Work: Bldg. 920 Undulator Hall Specification Documentation: _____

Project Manager: Georg Gassner Phone No: 3689 Organization: SLAC - AEG

Technical Representative Not Applicable Phone No: _____ Cell/Pager No: _____

Proposed Start Date: July 22, 2008 Scheduled Completion Date: November 30, 2008

Job Description : Install and test all components necessary to insure the proper operation of the Hydrostatic Leveling system. Activities will include the installation of hardware, supports, cables, instrument racks, sensor heads, piping and fill station components. This work is to be performed by SLAC personnel.

Part 2. Risk Classification & Safety Requirements (To be completed by Project Manager)

Risk Classification: ☐ High ☐ Moderate ☑ Low ☐ Very Low Determiner Mike Zurawel

Documentation: ☐ Full Safety Plan (IIPP) ☐ Pre-work Hazard Analysis ☐ Job Safety Analysis ☑ AHA ☑ JHAM

Safety Training : ☑ Turner Construction Safety Orientation ☐ GERT ☐ Site Specific

☐ Other _____

Pre-Construction/Installation Checklist Reviewed: ☐ (Appendix 1)

☑ Other Requirements: Entry into construction area and working in the Undulator Hall shall only be done after compliance with sign-in procedures and while wearing all required PPE.

Part 3. Design and ESH Review (Project Manager to obtain approvals as necessary.)

Reviewed Y	Reviewed N/A		Designated/Alternate	Signature & Date	Check If Comments Attached
☐	☐	SLAC CEF	*B. Skaggs*		☐
☐	☐	Radiation Protection	*S. Mao/S. Rokni*		☐
☐	☐	Environmental Management	*M. Hug*		☐
☑	☐	LCLS ES&H	*M. Scharfenstein*	7/23/08	☐
☐	☐	SLAC Citizen Committee & Safety Officer Review	*Building Inspection Office/Ernie Gomes*		☐
☑	☐	Quality Assurance	*D. Marsh*	7/23/08	☐
☐	☐	Accelerator Department	*See attached Acc.Dept. WAF*		☐
☑	☐	Area Manager	*Mike Zurawel*	7/23/08	☐
☑	☐	Building Manager	*David Saenz*	7/23/08	☐
☐	☐	Other _____ (specify)			☐

Attach relevant documentation to this form and submit to H. O'Donnell, LCLS Project Office upon completion

Part 5. LCLS Work Authorization Approval

The thresholds for work authorization approval are as follows:

High Risk and scope of work is > $100,000 – LCLS Project Director or Deputy Project Director, System Manager, Project Manager

High Risk and scope of work is <$100,000 – System Manager, Project Manager

Moderate, Low or Very Low Risk and scope of work is >$25,000 – Cost Account Manager or System Manager, Project Manager

Moderate, Low or Very Low Risk and scope of work is <$25,000 – Project Manager

Approvals:

Project Manager: Georg Gassner _____ Date: July 22, 2008

Cost Account Manager: _____ Date: 7/23/08

System Manager: _____ Date: _____

Project Director/Deputy Project Director: _____ Date: _____

Part 6. Feedback and Improvement

☐ Activity drawings redlined as necessary and delivered to applicable engineer for incorporation of changes into drawings.

Attach relevant documentation to this form and submit to H. O'Donnell, LCLS Project Office upon completion

Task or Employee: AEG Field Core Functions (Rev. 4) ☒ **Routine** ☐ **Non-routine**

Retention: Completed Routine JHAMs are retained by the employee and supervisor. Non-routine JHAMs are retained until the task is fully closed out. In the case of an accident, the form is to be retained for use by the review team.
Complete instructions and supporting information is available at *https://www-internal.slac.stanford.edu/esh/SLACsafety/jham/*. Enter information into boxes which will expand to accommodate whatever length of text is entered. Once this JHA is complete, all participants should sign in the Acknowledgement section. Add rows by placing cursor in the right box of the last row and entering a tab.

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
Loading Equipment from Alignment Lab and Storage Areas to Trucks or Vans: Moving of heavy and sometimes awkward equipment for an upcoming survey job. Equipment includes: ▪ Survey instruments (tracker, total station, level, etc.) ▪ Instrument stands (metal or wood) ▪ Leveling rods (up to 3m length) ▪ Cart (computer, power reel, etc.) ▪ Reflectors and targets ▪ Tools and tool bag.	o Back injury or strain o Crushing or pinching of hands and fingers o Crushing of feet	o Use proper lifting techniques. Ask for help or assistance when moving heavy or awkward objects o Push rather than pull heavy objects o Wear appropriate shoes and gloves when necessary o Break down equipment to make lighter and use appropriate carrying cases for transport **Training:** o *Personal Protection Equipment (PPE) (Course 255)*
Transporting Equipment to Job Site: Operating vehicles including vans, trucks, cars, electric carts and towing trailers.	o Accident o Dropping of loads o Falling off vehicle	o Only licensed drivers should operate a motor vehicle o Obey all traffic rules o Stack all equipment in a secure manner within vehicle o Secure unsteady or unbalanced loads in or on vehicles o Use safety chain for towed items

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
		○ Use hand-truck as alternative method of transferring gear from vehicle to job site. **Training:** ○ *Valid Driver's License*
Unloading and Transporting Equipment at Job Site: Unloading of survey equipment as described above. Some areas such as the damping rings or linac require the use of cranes to transport equipment and the use of stairs or ladders for access. Occasionally jobs may require the use of a forklift or electric cart.	○ Back injury or strain ○ Crushing or pinching of hands and fingers ○ Crushing of feet ○ Accident in cart or forklift ○ Dropping of loads damaging equipment or injuring people ○ Falling off vehicle ○ Falling down stairs or off ladder ○ Head injury ○ Rigging can give or break causing injury to bystanders	○ Use proper lifting techniques and ask for help if needed ○ Push rather than pull heavy objects ○ Wear appropriate shoes and gloves when necessary ○ Break down equipment to make lighter and use appropriate carrying cases for transport ○ Forklift training required for operators ○ Obey all traffic and safety rules ○ Stack all equipment in a secure manner within vehicle or on the forklift ○ Secure unsteady or unbalanced loads in or on vehicles and forklift ○ Keep within load limit of equipment ○ Inspect equipment and rigging before use ○ Ask for dedicated riggers to help on challenging tasks ○ Make sure personnel in area wear head protection if appropriate ○ Ladder safety (see section below) ○ Be aware of stair hazards such as keeping shoe laces secure and taking care with wet and/or slippery stair surfaces ○

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
		Training: o *Personal Protection Equipment (PPE) (Course 255)* o *Basic Crane Operations and Rigger Training (Course 280)* o *Forklift Operator Training (Course 283)* o *Stairway and Ladder Safety (Course 293)*
Job Site Survey: Entering possible radiological areas. Setting up surveying instruments, placing reflectors and other targets around area sometimes requiring the use of ladders or climbing over magnets, connecting computer(s) and power supply, placement of illumination if necessary. Adjustment of measured components such as magnets if necessary using non-powered hand tools such as wrenches. Movement of instruments for next set-up, rotating targets, changing illumination. Occasionally encountering the following: ▪ drilling new monuments using power tools such as hammer drills and also non-powered tools ▪ Use of hazardous materials such as epoxy for gluing targets or marking	o Exposure to radiation o Falling off ladders or elevated surfaces (see "Fall Protection" details in the Controls column) o Exposure to electrical energy o Electrical burns o Tripping over cords, obstacles and uneven surfaces o Cuts, stab wounds and eye injuries from powered and non-powered hand tools. o Electrical shock from power tools o Particles flying into eyes and inhalation of dust from drilling o Exposure to hazardous materials through eyes, skin and inhalation o Improper disposal of hazardous materials o Bumping into objects with head or body o Getting in the way of other workers o Lack of proper breathing atmosphere (asphyxiation) in confined spaces	o Follow all radiological signage o Inspect ladders before use and don't use damaged ones. Use the right ladder for the right job o Zone off area if there is a potential for falling objects Fall Protection: o Use fall protection when working on elevated surfaces (above 4 feet in height and within 6 feet of edge). Ensure the equipment is inspected by a SLAC competent person twice annually and before use o Before each use, read safety tags (which can only be marked by a SLAC competent person), inspect harnesses, lanyards, self-retracting lifelines, and connecting hardware for wear, damage, contamination, and other deterioration according to manufacturer's instructions and checklists (see ES&H's Forms & Tools for manufacturers' pre-use checklists). Equipment not meeting inspection criteria will immediately be tagged "Danger – Out of Service" and will not be used o Prior to an authorized person working on an elevated surface, establish a work procedure via an Elevated Surface Work Plan (ESWP). Have an ES&H competent person develop and/or approve the

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
surfaces using spray paint ▪ Entering tight or confined spaces such as for working on the linac laser ▪ Working around magnets and other equipment with possible electrical power ▪ Working in warm environments ▪ Working in noisy environments	○ Dehydration ○ Loss of hearing	plan along with approval by the building manager. (The ESWP will address the associated fall hazards. It also includes a rescue plan if fall arrest systems are in use) ○ A Fall Protection Plan (FPP) must exist when conventional fall protection (guardrails, fall arrest or restraint equipment, safety nets) are impractical or more dangerous for working on an elevated surface: ▪ FPP's are kept at the job site and are similar in function to an AHA. It is approved by a SLAC division director or higher only ▪ If there is no FPP available at the job site, and you believe the job may require it, bring this to the attention of the SLAC competent person and the building manager. DO NOT START THE WORK until authorized to do so by the competent person *Notes:* *The FPP is created by a designated SLAC qualified person and the plan must be implemented only under the supervision of a SLAC competent person (i.e. the AEG does not create this document but must follow it if applicable). The FPP will identify locations where conventional fall protection methods cannot be used and will designate these locations as controlled access zones (CAZ), and will identify each employee allowed to work in the CAZ* ○ Have someone hold the ladder if needed ○ Position ladder away from doors or other potential hazards ○ Store ladders so that they do not block exits in the event of an earthquake ○ Talk to area managers before working in areas with power sources ○ Apply lock and tag procedures

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
		o Verify equipment is de-energized (need further guidance) o Don't rush. Assess potential trip hazards and secure power cords away from traffic o Wear gloves when practical o Use liquid wrench or similar product to pre-loosen tight bolts o Inspect power tool and cords for wear and damage. Don't use equipment with damaged power cords o Use GFCI on extension cords o Do not "daisy chain" extension cords/power strips o Wear safety glasses, preferably with side shields. Consider also hearing protection when drilling. o Consider the use of a dust mask for drilling or even spray painting o Read and understand the Material Safety Data Sheets (MSDS) for hazardous materials such as epoxies and glues. o Properly dispose of hazardous waste taking extra consideration in potentially radiologically contaminated areas o Wear a hard hat or bump hat if necessary o Practice good housekeeping especially in tight areas o Be aware of your surroundings and communicate with other workers o For confined spaces, contact ES&H personal to obtain confined space entry permit. Follow all requirements and rules o In warm areas drink plenty of water. Bring water sources provided in fridge to job site. Rest if you feel dizzy and hydrate as soon as possible o In noisy areas wear hearing protection whenever possible o Wear hearing protection in areas defined as "hearing protection required"

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
		Training: o *General Employee Radiological Training (GERT) (Course 115) for RCA's* o *Radiological Worker Training I (RWT I) (Course 116) for High Radiation Areas* o *Radiological Worker Training II (RWT II) (Course 250) for Contamination Areas* o *Stairway and Ladder Safety (Course 293)* o *Fall Protection Training (Course 200)* o *Lock and Tag Program for the Control of Hazardous Energy (Course 157)* o *Electrical Safety for non-electrical workers (Course 239)* o *Electrical Safety for R&D Equipment (Course 251) for equipment at or above 50V* o *Permit-Required Confined Space Safety (Course 144)*
Packing Up and Leaving Job Site: See above for loading and transporting equipment back to alignment lab and storage areas.		
Alignment and Calibration Laboratories: ▪ use of hand tools (non-powered) such as wrenches, hammers, saws and screw drivers ▪ soldering ▪ use lasers ▪ earthquake	o puncture wounds / cuts o eye injury o burns o inhalation of fumes o falling objects / blocked doorway (only one exit) in the calibration laboratory	o use Personal Protection Equipment (PPE) when necessary such as gloves, safety glasses and steel-toed boots o apply force away from body when prying o use protective holder to store heated soldering iron o properly dispose of solder dross o solder in well ventilated area

Sequence of Basic Job Steps	Potential Hazards	Controls & Recommended Actions
		○ follow AEG laser guidelines: http://www-group.slac.stanford.edu/met/Align/Safety/Laser_List.xls ○ make sure phone communication is working and be sure someone is informed that you are working in the calibration laboratory
Entering Construction Sites: ▪ situations when a construction site is being visited	○ exposure to various construction activities and other hazardous situations: ▪ excavations ▪ tunneling ▪ large equipment ▪ scaffolding ▪ working at heights ▪ hand tools / power cords	○ Plan and discuss scope of visit with appropriate area or building manager and safety officer. Announce entry and inform of presence. ▪ observe and follow safety signs (e.g., "wear safety glasses in this area", "close-toed shoes required", "hard-hat area") ▪ be aware of surroundings
Entering Research Areas, Shops, and Experimental Facilities: ▪ situations when a research area, shop or experimental facility is being visited	○ exposure to all the work activities that are being performed in the area such as: ▪ moving machinery ▪ trips ▪ flying chips/metal ▪ weld flash ▪ crane hazards ▪ electrical hazards	○ Plan and discuss scope of visit with appropriate area or building manager and safety officer. Announce entry and inform of presence. ▪ observe and follow safety signs ▪ respect barricades and postings ▪ do not touch anything unless sure it is ok to do so ▪ be aware of surroundings

Acknowledgements	Print Name	Signature or Initialed	Date
Supervisor:	Catherine LeCocq		5/14/08
Participants:	Brian Fuss		5/14/08
	Georg Gassner		5/20 08
	Francis Gaudreault		5/20/08
	Mike Gaydosh		5/20/08
	Levirt Griffin		5/20/08
	Hans Imfeld		5-20-08
	Miho Matias		
	John McDougal		5-20-08
	Michael Perry (subcontractor)		
	Bob Pushor		5-27-08
	Mike Rogers		5-20-08
	Bryan Rutledge		5-20-08

Stanford Linear Accelerator Center
Metrology Department
2575 Sand Hill Road, Menlo Park, CA 94025
Tel.: (650) 926 3689, Fax: (650) 926 4055

4-25-2008

Hydrostatic Leveling System

LCLS

Work Description

Author: Georg Gassner / AEG
File: HLS_work description.DOC

1 Sensor Head Installation

The sensing surface of the capacitive sensors is very fragile, improper handling will result in the fracturing of the surface. The sensor surface is not readily available, the lead time for it is 6 months to one year. A fracture is not detectible without visually inspecting it. If the sensors are installed under Davis Bacon, they have to be taken out again, inspected and set back into the vessel.

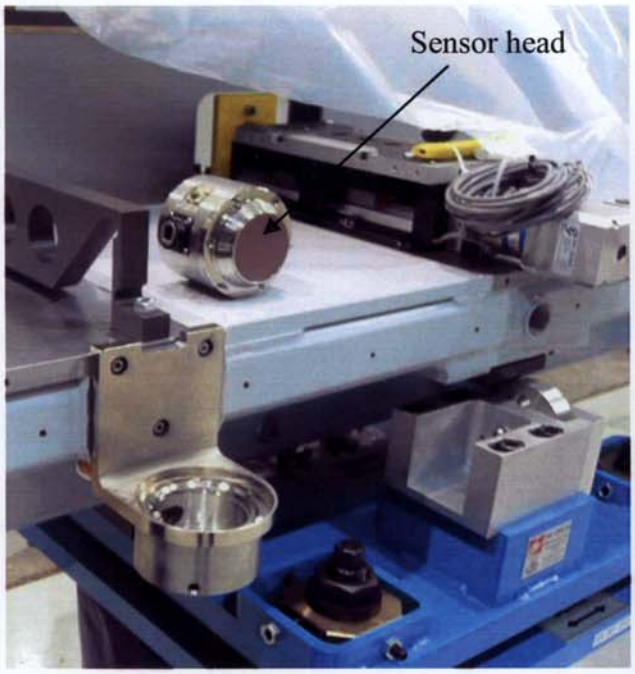

Figure 1: Before installation

Figure 2: After Installation

2 Clamping of bellows between girders

This step consists of shifting the preinstalled bellow from the side position to the middle position and fastening the hose clamps, any foreign object has to be kept out of the pipe to avoid algae / fungi growth. Work duration, 2 minutes per bellow.

Figure 3: Before installation step

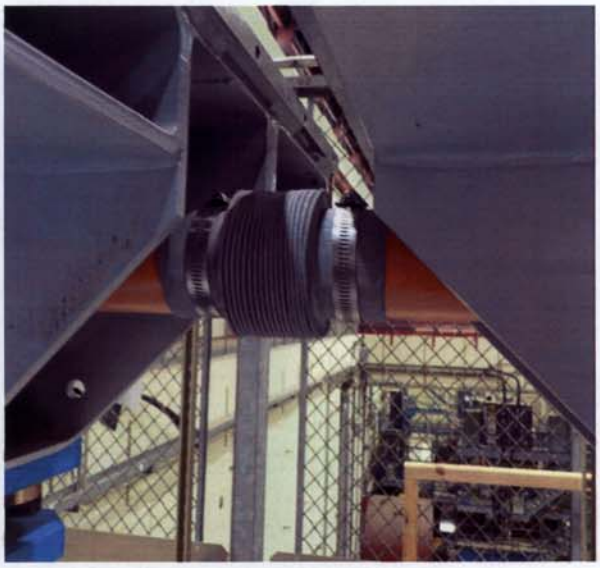

Figure 4: After Installation step

3 Long break pipe installation

Ten long break sections have to be set in place and connected via hose clamps to the existing pipe system, any foreign object has to be kept out of the pipe to avoid algae / fungi growth. Work duration, 5 minutes per long break.

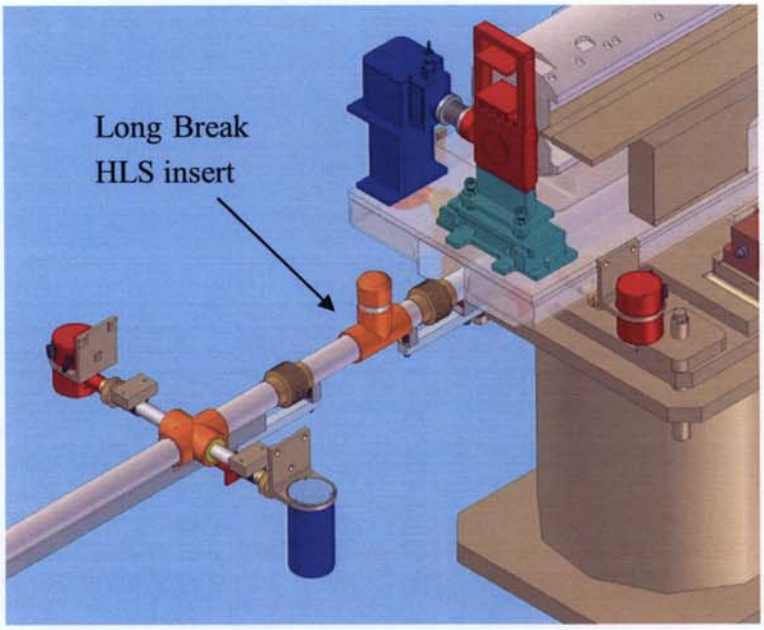

Figure 5: Long break HLS insert

4 LTU connection

This pipe section has to be installed level to the preinstalled Unistrut studs. Cleanliness is important, any foreign object has to be kept out of the pipe to avoid algae / fungi growth. Work duration, 8 hours.

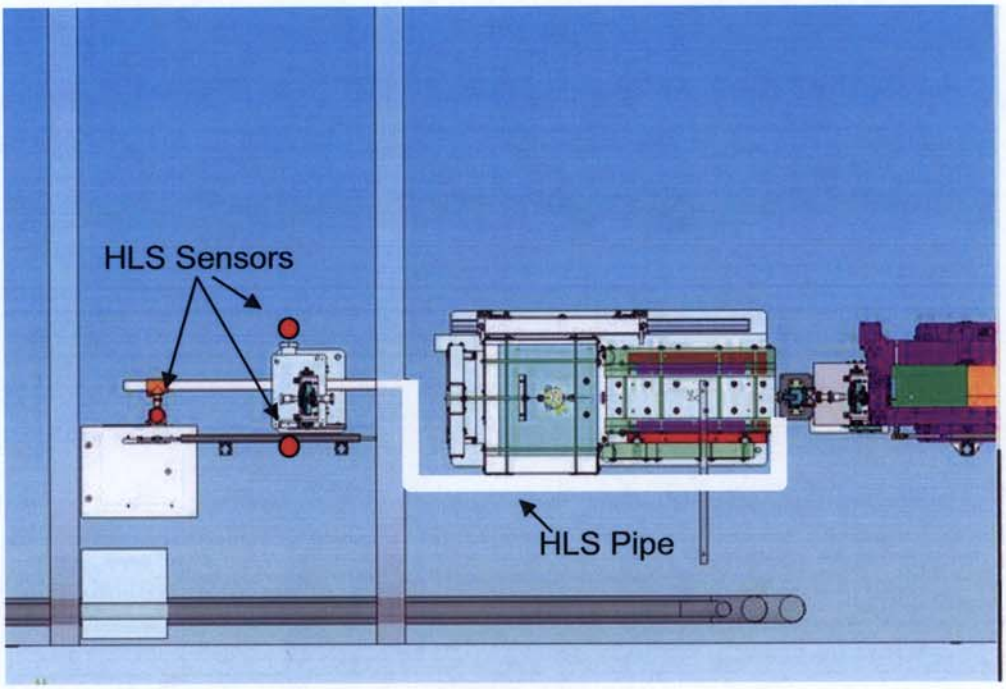

Figure 6: Vestibule to first girder HLS installation