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### **Notification of Change Request to Switch SEI Fabrication Order**

This letter is a notification that the Advanced LIGO Change Control Board has approved a change request to switch the order of fabrication of the Internal Seismic Isolation (ISI) systems in the Seismic Subsystem (SEI), per the attached Change Request ACR-08003. ACR-080003 recorded the adjustment to the schedule and a transfer of \$100K from contingency for additional first article testing of the Two Stage, BSC chamber ISI. There are no driving technical or logistical reasons to fabricate one ISI system before the other. Switching the order has no substantive impact on the project.

The fabrication and installation of the Single Stage, HAM ISI prototypes into Enhanced LIGO has proceeded faster than planned, allowing procurement and fabrication to start much earlier than the baseline schedule shows. Characterization of the prototype Two Stage ISI is progressing quite well, and we do not anticipate any difficulties in meeting the schedule. The Two Stage ISI would benefit, however, from additional testing of a redesigned actuator before committing to procurement.

Early testing on the Two Stage, BSC prototype indicated that an actuator redesign was desirable. The redesign was implemented for the Single Stage, HAM ISI prototypes and is being tested in Enhanced LIGO. Delaying production for the Two Stage, BSC ISI would allow similar testing of the actuator redesign in the prototype stage, reducing risk during the installation and testing phase.

As a result of this change, the Single Stage Seismic ISI fabrication will start first and the Two Stage Seismic Isolation System will start at the later date originally planned for the Single Stage ISI. Thus, ISI fabrication activities will start on the same date as previously planned, but the order of the two ISI builds has been switched. There are no impacts to the overall project schedule or major reporting milestones outside the Seismic Isolation Subsystem. The potential cost impact due to escalation of the delayed larger costs for the Two Stage system is judged to be an acceptable consequence.

The start dates for procurement and for assembly for the two types of ISI are included as performance reporting dates in the Cooperative Supplemental Agreement PHY-0328418 for the Advanced LIGO project. The attached charts illustrate the effects of the announced change in activity order. The first AdL Milestone Chart shows the schedule difference against the existing baseline plan for the rescheduling of the two types of ISI. The Single Stage ISI is ahead of schedule and the Two Stage is late. The schedule differences are eliminated when the tasks are exchanged, as shown in the second chart. The date of the first task matches the original first SEI ISI start date, and the second matched that for the second ISI start. Again, switching the order of fabrication has no substantive impact on the project.

LIGO-L080081-00-P

Please contact me for any questions regarding this change.

Sincerely,

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### Advanced LIGO Project Milestones – Switch in SEI Fabrication Order

**Advanced LIGO Milestone Chart:** Early dates are used in earned value performance measurement baseline. The NSF Reporting dates include estimated schedule contingency usage and are the contractual dates in the Cooperative Support Agreement.

Activity ID	Activity Name	Baseline Early Dates	Current Dates (Jun 08)	Schedule Slippage (Days)	NSF Contract Dates
PM-M50012	Project Funding Start	Apr-08	Apr-08	Done	Jun-08
CO-M51110	Core Optics Glass Blanks Contract Awarded	Jul-08	Jul-08	-6	Sep-08
CO-M59770	Core Optics Polishing Contract Awarded	Dec-08	Dec-08	-4	Apr-09
SI-M7022	Two Stage Seismic Isolation Procurement Start	Jan-09	Jul-09	-125	May-09
CO-M59760	Core Optics Coating Contract Awarded	Apr-09	Apr-09	0	Aug-09
SU-M03450	Suspensions (NSF-Funded) Procurement Start	May-09	May-09	2	Sep-09
SI-M7030	Single Stage Seismic Isolation Procurement Start	Jul-09	Jan-09	126	Nov-09
SI-M7120	Two Stage Seismic Isolation Assembly Start	Oct-09	Mar-10	-110	Feb-10
SI-M7130	Single Stage Seismic Isolation Assembly Start	Mar-10	Oct-09	111	Jul-10
SU-MA3560	Suspensions (NSF-Funded) Assembly Start	Apr-10	Mar-10	24	Sep-10
IN-M00030	Shutdown Operations at First Site - Installation Start	Feb-11	Feb-11	0	Apr-11
IN-M00035	Shutdown Operations at Second Site - Installation Start	Oct-11	Oct-11	0	Nov-11
IN-MA2800	Installation Complete at First Site	Feb-12	Feb-12	0	Jun-12
IN-MA2820	Installation Complete at Second Site	Jan-13	Jan-13	0	Apr-13
IN-M00032	Acceptance Review for First Interferometer Completed	Jun-13	Jun-13	2	Jan-14
IN-M00037	Acceptance Review for Second Interferometer Completed	Jan-14	Jan-14	0	Aug-14
IN-M00042	Acceptance Review for Third Interferometer Completed	Apr-14	Apr-14	0	Nov-14
DC-M50018	Data Analysis and Storage Computers Procurement Start	Sep-14	Sep-14	0	Sep-14
DC-M59000	Data Analysis and Storage Computers Completed	Mar-15	Mar-15	0	Mar-15
PM-M20040	Project End Date	Mar-15	Mar-15	0	Mar-15

**Modified Baseline Early Dates:** Red and green highlighted dates show the effect of delaying the two-stage internal seismic isolation (ISI) and accelerating the single stage ISI current plan start dates without switching the baseline or the NSF contract / reporting dates. The subsystem ISI work starts on the same date and finishes in time for installation, but two of the reporting dates within the Seismic Isolation Subsystem will not be met. Dates outside the SEI subsystem and the overall project timeline are not affected.

Activity ID	Activity Name	Baseline Early Dates	Current Dates (Jun 08)	Schedule Slippage (Days)	NSF Contract Dates
PM-M50012	Project Funding Start	Apr-08	Apr-08	Done	Jun-08
CO-M51110	Core Optics Glass Blanks Contract Awarded	Jul-08	Jul-08	-6	Sep-08
CO-M59770	Core Optics Polishing Contract Awarded	Dec-08	Dec-08	-4	Apr-09
SI-M7030	Single Stage Seismic Isolation Procurement Start	Jan-09	Jan-09	0	May-09
CO-M59760	Core Optics Coating Contract Awarded	Apr-09	Apr-09	0	Aug-09
SU-M03450	Suspensions (NSF-Funded) Procurement Start	May-09	May-09	2	Sep-09
SI-M7022	Two Stage Seismic Isolation Procurement Start	Jul-09	Jul-09	0	Nov-09
SI-M7130	Single Stage Seismic Isolation Assembly Start	Oct-09	Oct-09	0	Feb-10
SI-M7120	Two Stage Seismic Isolation Assembly Start	Mar-10	Mar-10	0	Jul-10
SU-MA3560	Suspensions (NSF-Funded) Assembly Start	Apr-10	Mar-10	24	Sep-10
IN-M00030	Shutdown Operations at First Site - Installation Start	Feb-11	Feb-11	0	Apr-11
IN-M00035	Shutdown Operations at Second Site - Installation Start	Oct-11	Oct-11	0	Nov-11
IN-MA2800	Installation Complete at First Site	Feb-12	Feb-12	0	Jun-12
IN-MA2820	Installation Complete at Second Site	Jan-13	Jan-13	0	Apr-13
IN-M00032	Acceptance Review for First Interferometer Completed	Jun-13	Jun-13	2	Jan-14
IN-M00037	Acceptance Review for Second Interferometer Completed	Jan-14	Jan-14	0	Aug-14
IN-M00042	Acceptance Review for Third Interferometer Completed	Apr-14	Apr-14	0	Nov-14
DC-M50018	Data Analysis and Storage Computers Procurement Start	Sep-14	Sep-14	0	Sep-14
DC-M59000	Data Analysis and Storage Computers Completed	Mar-15	Mar-15	0	Mar-15
PM-M20040	Project End Date	Mar-15	Mar-15	0	Mar-15

- = Schedule slippage of 1 month or less from the Approved Baseline Dates.
- = Schedule slippage greater than 1 month from the Approved Baseline Dates.
- = Schedule slippage resulting in missing an NSF Contract Date.

**Switched Tasks:** Exchanging the two tasks in the current plan brings the SEI schedule into alignment with the baseline early dates and the NSF reporting dates, showing no substantive impact to the SEI subsystem. The first ISI procurement start date is still January 2009, and the second ISI procurement start is still July 2009.