
PRE-PROPOSAL CONFERENCE

ELECTRICAL CONTRACTOR SERVICES for the BEAM TUBE BAKEOUT at the LIGO LIVINGSTON OBSERVATORY

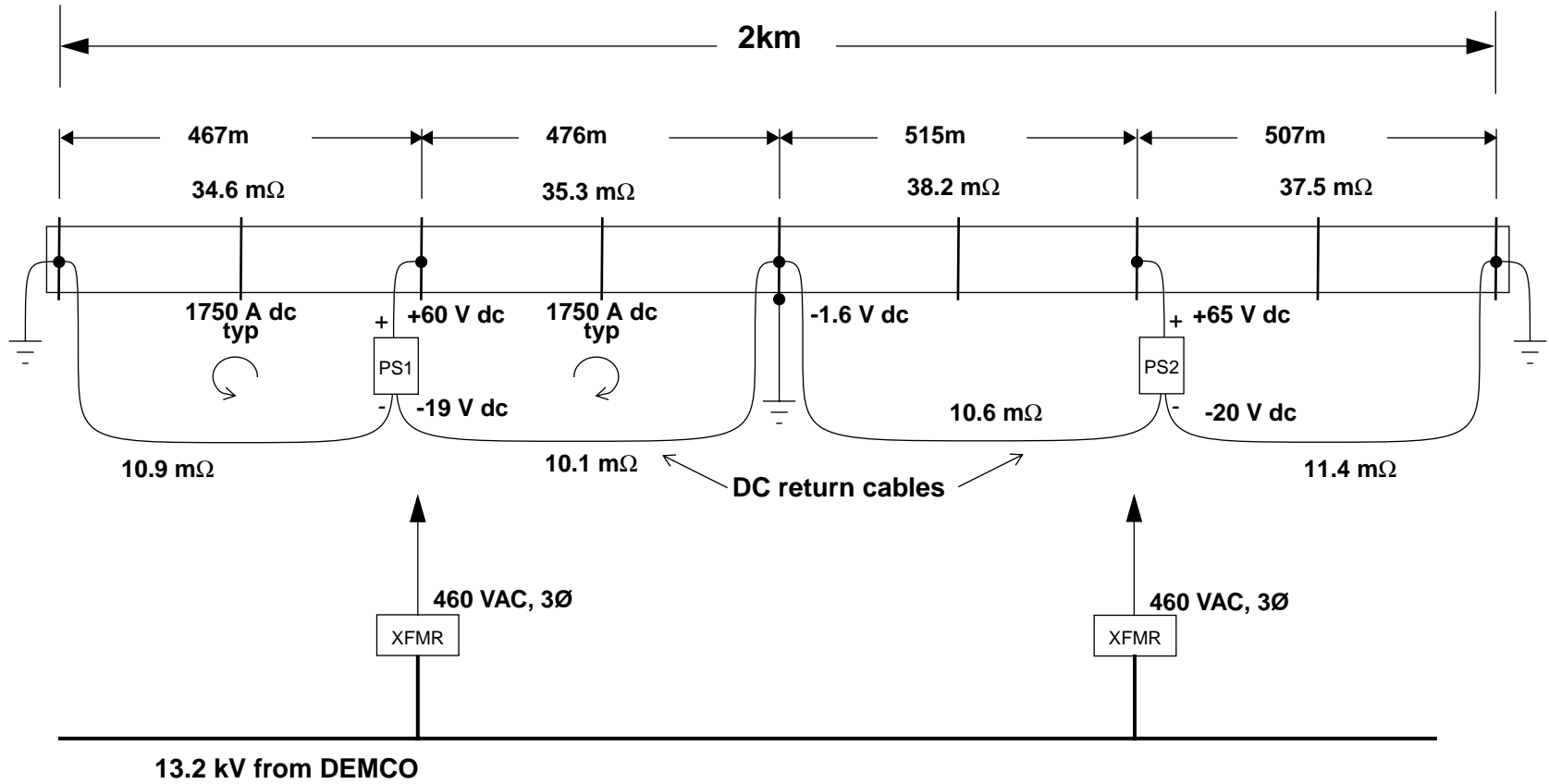
*16 June 1999
W. E. Althouse*



ABOUT LIGO, BEAM TUBE BAKEOUT

- LIGO LIVINGSTON OBSERVATORY
 - ›› One of a pair of US facilities built to explore gravitational-wave astrophysics
 - ›› Employs laser interferometry to measure changes in 4 km arm lengths by 10^{-18} m
 - ›› Sponsored by National Science Foundation, operated by Caltech & MIT
- Beam tube bakeout
 - ›› Reduces gas pressure in the beam tube vacuum to minimize interference with measurement laser beams
 - ›› Reduces contaminants in beam tube which could spoil precision mirrors

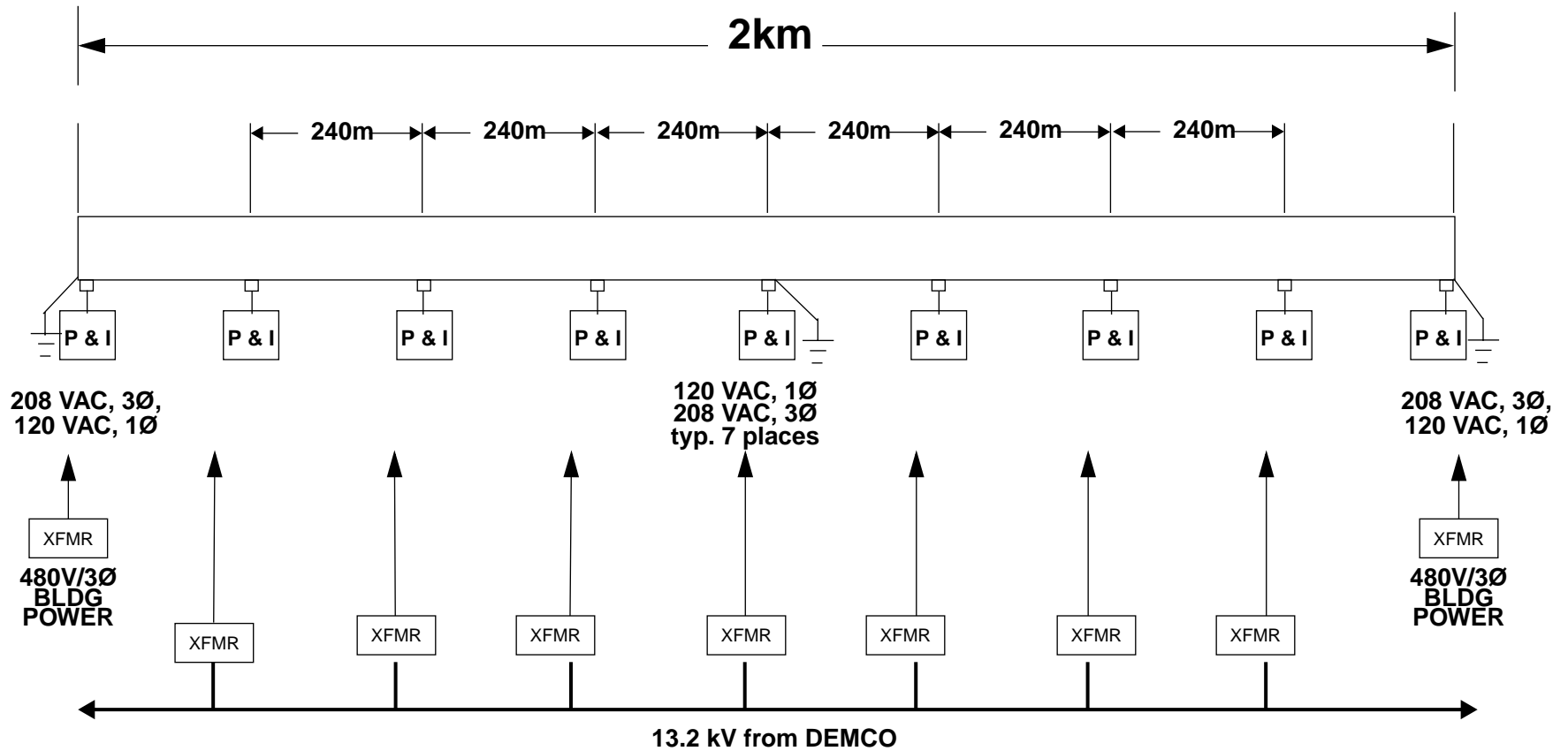
BEAM TUBE BAKEOUT ELECTRICAL HEATING POWER



Legend: XFMR Power Transformer PS Low voltage, high current DC power supply



ELECTRICAL POWER FOR HEATER JACKETS, PUMPS AND INSTRUMENTATION



Legends:

□ Pump Port

P & I Pumps & Instrumentation



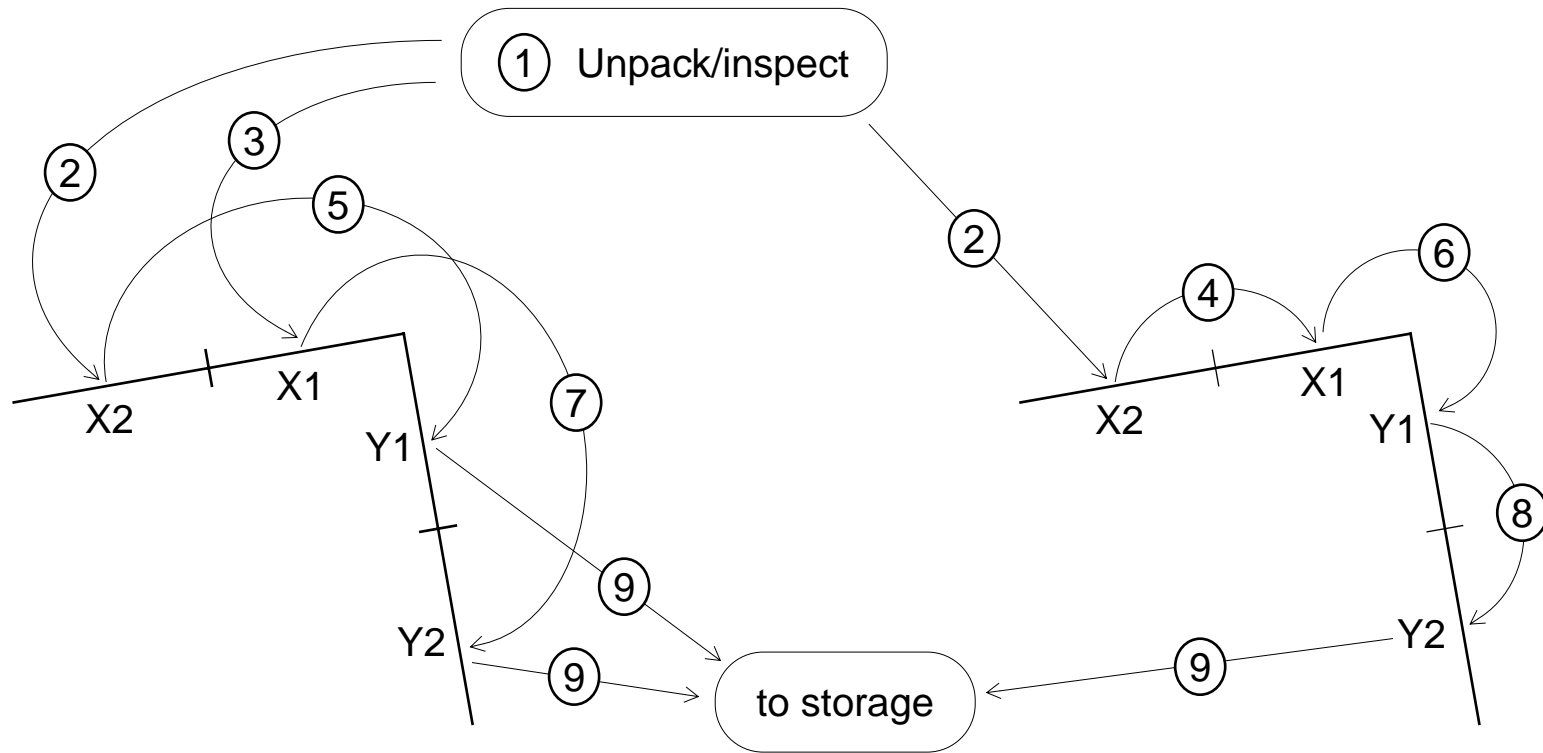
WORK FLOW

Equipment ID ()		
<i>AC and DC supplies; tube connections</i>		<i>DC cables</i>
<i>(set 1)</i>	<i>(set 2)</i>	
A1/A3 assys (5) DC PS trailers (2) E transition boxes (7) DC tube connects (5x17) A2 assys (2)	A1/A3 assys (5) DC PS trailers (2) E transition boxes (7) DC tube connects (5x17) A2 assys (2)	DC supply cables, short (16) DC return cables, long (16) D-2 junction boxes (5)

Task	Activity		
1	Unpack and inspect		
2	Install at X2		Unreel and install at X2
3		Install at X1	
4			Move to X1
5	Move to Y1		
6			Move to Y1
7		Move to Y2	
8			Move to Y2
9	Deinstall and pack for storage		Return to reels



WORK FLOW (CONTINUED)



AC Panelboards &
DC supplies (2 sets)

DC return cables &
D-2 junction boxes

SCHEDULE

Task 1	As required to meet the schedule for tasks 2 & 3
Task 2	2 weeks ARO
Task 3	5 weeks ARO
Task 4	1 week after Notice to Proceed with task 4
Task 5	4 weeks after Notice to Proceed with task 5
Task 6	1 week after Notice to Proceed with task 6
Task 7	4 weeks after Notice to Proceed with task 7
Task 8	1 week after Notice to Proceed with task 8
Task 9	4 weeks after Notice to Proceed with task 9



LIGO Hardware Installation and Commissioning Summary Schedule

ID	Task Name	Duration	Start	Finish	Q3 '99			Q4 '99			Q1 '00			Q2 '00			
					Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1	BEAM TUBE BAKEOUT - LIGO LIVINGSTON OBSERVATO	207 days	7/15/99	4/28/00													
2																	
3	Electrical Services for Bakeout	207 days	7/15/99	4/28/00													
4																	
5	Award Electrical Services Contract	1 day	7/15/99	7/15/99													
6	Mobilize	5 days	7/16/99	7/22/99													
7	Install and Connect DC Power at X2	5 days	7/23/99	7/29/99													
8	Checkout setup and verify all equipment ready for bakeout	20 days	7/30/99	8/26/99													
9	Bakeout X2	20 days	8/27/99	9/23/99													
10	Evaluate X2 bake	10 days	9/24/99	10/7/99													
11	Install AC/DC Power, DC tube connections at X1	15 days	7/30/99	8/19/99													
12	Move DC Cables to X1	5 days	10/1/99	10/7/99													
13	Bakeout X1	20 days	11/1/99	11/26/99													
14	Evaluate X1 bake	10 days	11/29/99	12/10/99													
15	Move AC/DC Power set 1 to Y1	15 days	10/22/99	11/11/99													
16	Move DC Cables to Y1	5 days	12/6/99	12/10/99													
17	Bakeout Y1	20 days	1/10/00	2/4/00													
18	Evaluate Y1 bake	10 days	2/7/00	2/18/00													
19	Move AC/DC Power set 2 to Y2	15 days	12/27/99	1/14/00													
20	Move DC Cables to Y2	5 days	2/14/00	2/18/00													
21	Bakeout Y2	20 days	3/6/00	3/31/00													
22	Evaluate Y2 bake	10 days	4/3/00	4/14/00													
23	Pack AC/DC Power set 1, ship to storage	10 days	4/3/00	4/14/00													
24	Pack AC/DC Power set 2 and other equip, ship to storage	10 days	4/17/00	4/28/00													

T&M CONTRACT PROPOSAL

- Indicate relevant experience and provide at least two references
- Indicate availability of manpower, equipment and other resources needed to perform the work, and whether employed/owned by you or obtained elsewhere
- Describe how you would accomplish the work according to schedule (how many people, what skill levels, what equipment, how to manage the transient nature of work)

T&M CONTRACT PROPOSAL

- Cost breakdown: for each task (1-9), provide:
 - ›› Estimated labor hours for each labor category (journeyman, apprentice, helper, foreman, etc.)
 - ›› Estimated equipment usage hours for each equipment category
 - ›› Estimated materials cost (including all burdens, markups and profit)
- For the total job, provide:
 - ›› For each labor category: total estimated labor hours (sum of tasks 1-9), labor rate (including all burdens, markups and profit) and total estimated labor cost
 - ›› For each equipment category: total estimated equipment usage hours, equipment usage rate (including all burdens, markups and profit) and total estimated equipment cost
 - ›› Total estimated material cost (including all burdens, markups and profit)