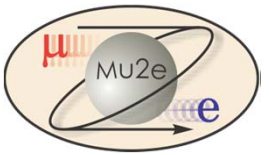
Fermilab

U.S. DEPARTMENT OF ENERGY Office of Science

Mu2e Conventional Construction Value Engineering



Lee Hammond
VE Study Coordinator
7/9/2014

Value Engineering @ start of Final Design

- Workshop was held in 2013 on Feb 14th and 15th
- Based on US Army Corp of Engineers Methodology
  - 20 participants including the major discipline leads from the A&E.
    - Also used as an introduction to the A&E team.
  - Speculation list contained 62 items; 20 have been accepted.
- The project was described by the project technical teams (PM, Accelerator, Solenoids and Muon Beam) and the Conventional Construction design engineers.
- The VE process was defined and the charge to the panel was given.
- A functional analysis of the experiment along with the physics goals was described by the project's experimental team.
- The speculation session followed. The group was encouraged to make proposals for value engineering ideas, whether they affected budget, schedule, quality or life cycle cost of the project. At this point there are no bad ideas; all are accepted.
- The proposals were gathered into a Speculation List and a first cut was made. Accepted proposals were selected for further evaluation.
- With the Speculation List organized into engineering disciplines, members of the project team were assigned to develop and lead the further evaluation of the selected proposals.

Speculation List

Speculation List

Color Legend (DRAFT Feb. 14-15, 2013)
(Gut-Feel) may **not** result to large savings
(Gut-Feel) may result to savings. Will be evaluated? (potential cost savings TBD)
Obvious Cost Savings
Warranted Increase in Performance to be evaluated
Will be evaluated By Others, not CES, whether high cost savings impact or not
(not shaded) = Items that I'm Not Sure

Priority	Item Number		Proposed Action	Who to develop short description	(gut-feel) Estimated Cost Savings	Comment
	43	use Indian Ck road as part of the truck turnaround, take out new turnaround	Accepted	Adam	$-10K	
	44	interrupt Kautz Rd tertiary power feed		Adam	$-10K	
	45	shorten gas routing that follows Kautz Rd	Accepted	Adam	$-10K	
	24	make generator natural gas	Accepted	Tom	NA	*Lower Operating Costs*
	50	remove EG from containment area	Accepted	Randy		
X	12	relocate stair 4 to west corridor from stair 3	Accepted	Tom	$-100K	
X	13	relocate stair 2 corridor from stair 1	Rejected due to Shielding	Tom	$-100K	*May not meet shielding reqd.*
X	23	eliminate Kautz road bypass and straighten east route	Accepted	Lee/Adam	$-500K	*Needs Directorate OK*
	27	look at location of dump resistor	Checking	Kermit	$-1K	
	28	reduce parking spaces	Rejected	Emil	$-.5K	
	29	use MC1 parking with walkway over berm	Rejected	Tom		
	47	re-contour parts of stockpile to lessen dirt removal	Accepted	Chuck	$-100K	
	48	closer stockpile... south of bldg	Accepted	Tom		
X	49	simplify underground structure at column B1		William		
	51	dry type transformers adjacent to bldg.		Tom		
	52	ballast issues, remote limitations		Sukdev		
	59	two smaller transformers	Rejected	Randy W		
X	26	reduce mech room space		Lee		
	57	provide infrastructure for rental HVAC for installation phase	Accepted	Emil	NA	
	58	conduct model reviews	Will evaluate With A&E	Adam		
	10	replace shielding blocks with cast in place where possible	Accepted	Tomski		
	14	examine penetration material		Tom		
X	22	flip elec/mech room to eliminate utility congestion	Accepted	Randy	NA	Better Design
X	30	benefit of raising low bay	Rejected	Steve D		
X	32	Mezzanine over portion of low bay	Rejected	Kermit		
X	37	stack toilet and mech space to reduce low bay area	Rejected			
	53	unforeseen conditions clause policy		Tom		Transfer Risks
	1	Waterproof or control water inflow in the PS region	Accepted	Tomski/Steve E.		
	2	Provide for Collection of process water in enclosure especially around PS / trench gutter along walls	Accepted	Kermit		
	11	building over PS hatch Weather protection while open	Not Accepted	Jeff		
	21	turn west crane catwalk 180degrees	Accepted	Tom		
	41	hardstand for PS hatch	Accepted	Adam		
	36	integrate future clean space system with civil HVAC system	If criteria is provided we will accept	Tom		
	55	provide sealed combustion gas appliances		Lee		
	17	procure shielding blocks with later funding	Defer to PM	Tom		
	54	TS hall , imbed transfer lines into wall, increase highbay 2 feet	Accepted	Jeff		
X	60	make room for tornado shelter in stair 1, enhance room for controlled access entry	Stairs 1 and 2 will be the shelter areas, accept breaking interlock if needed.	Tom/Lee		

Highest value proposals

- Items with major value impact
  - Eliminated Kautz Rd bypass
    - The building falls squarely on existing Kautz road and could not be moved due to beamline lattice constraints. The Advanced Conceptual Design had the road moved behind the building.
    - By eliminating the portion of road between Giese and South Booster Road we saved excavation of the stockpile and gained space for stockpiling of excavated earth from the building foundation.
    - Radiation studies have shown that the earth where the road would have been relocated to is needed for shielding.
  - Reduced number of stairs tower
    - Eliminated the stair from the remote handling Room and replaced with horizontal passage to adjacent stair.
  - Increased crane hook height
    - By raising the crane hook height (and overhead door) it allows for the solenoids to be delivered on a either a special low boy or special flatbed truck trailer. At this time the trailer type has not been determined.

Continued VE

- On going value added measures subsequent to the VE workshop include:
  - Underground FRP pipe changed to epoxy coated/cement lined carbon steel pipe. FRP was deemed a collapse risk especially during possible future excavation.
  - Double wall ductwork changed standard galvanized in areas where corrosion risk are considered low.
  - ICW vacuum pump cooling changed to chilled water cooling to prolong vacuum pump life.
  - Enhanced the outside air supply system by applying a side stream desiccant unit to reduce incoming air dewpoints by 10 degrees F.
  - Electrical floor plan layouts were optimized in collaboration with AD personnel.
  - Repurposing transformers and switchboards from DZero