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# BDX Civil Update

- Slides for use in presentation to management

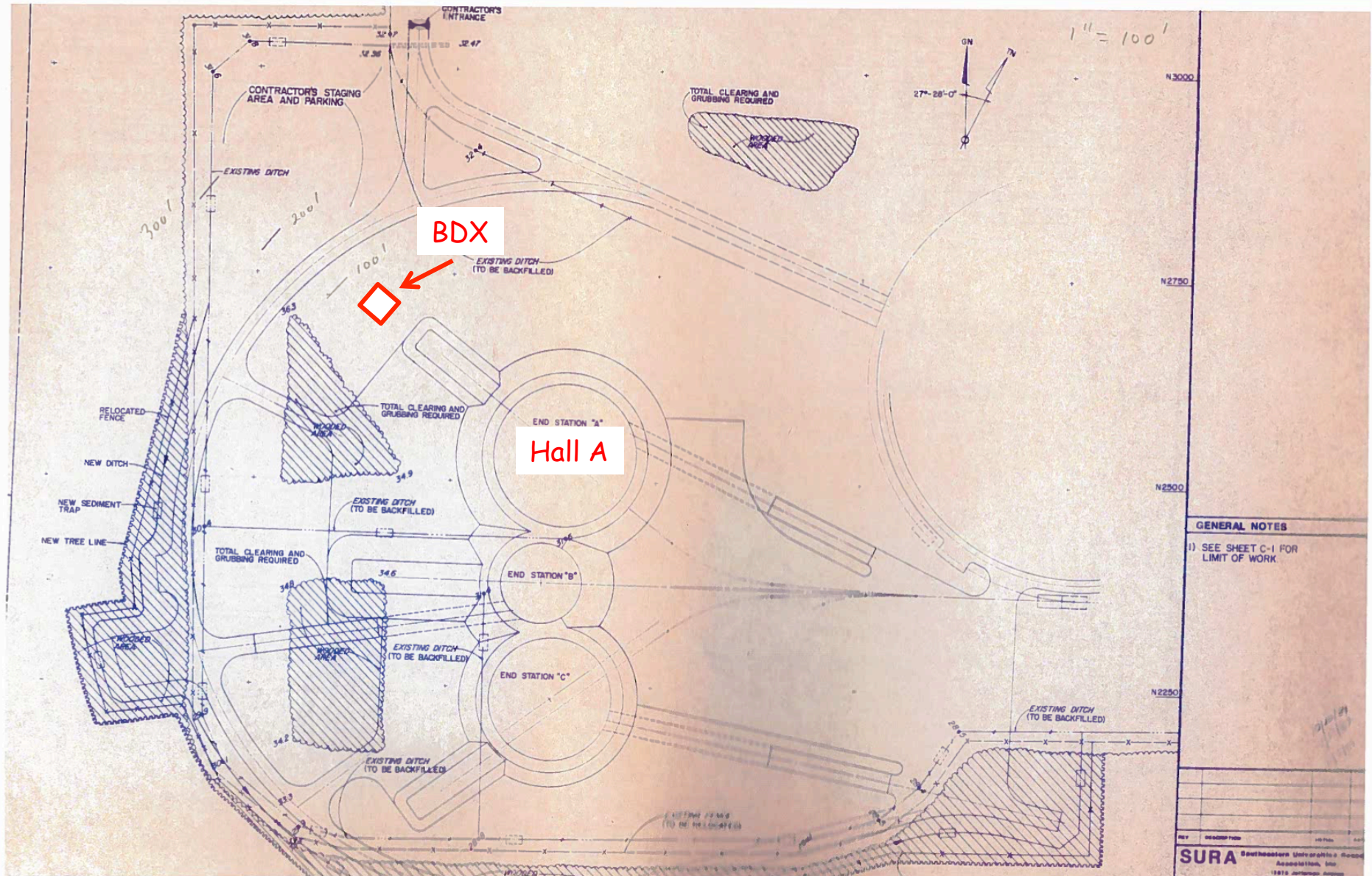
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March 24, 2016

# Outline (Concept C1)

- Concept C1 includes an above-ground building (30'x30') with a crane to lower the detector underground and stair access to the underground room.
- The detector would be lowered down through an access shaft and then rolled into a room, which is shielded from cosmic rays by the overburden.
- The experimental room is accessible using the stair connection to the underground. Electronic racks would likely reside underground with only fiber connections to the outside world.
- The environment for the entire building would be controlled for proper operation of the detector and electronics.
- Assumes existing concrete and dirt is sufficient to shield any beam-related backgrounds.
- The estimated cost for this facility is approximately \$1M.

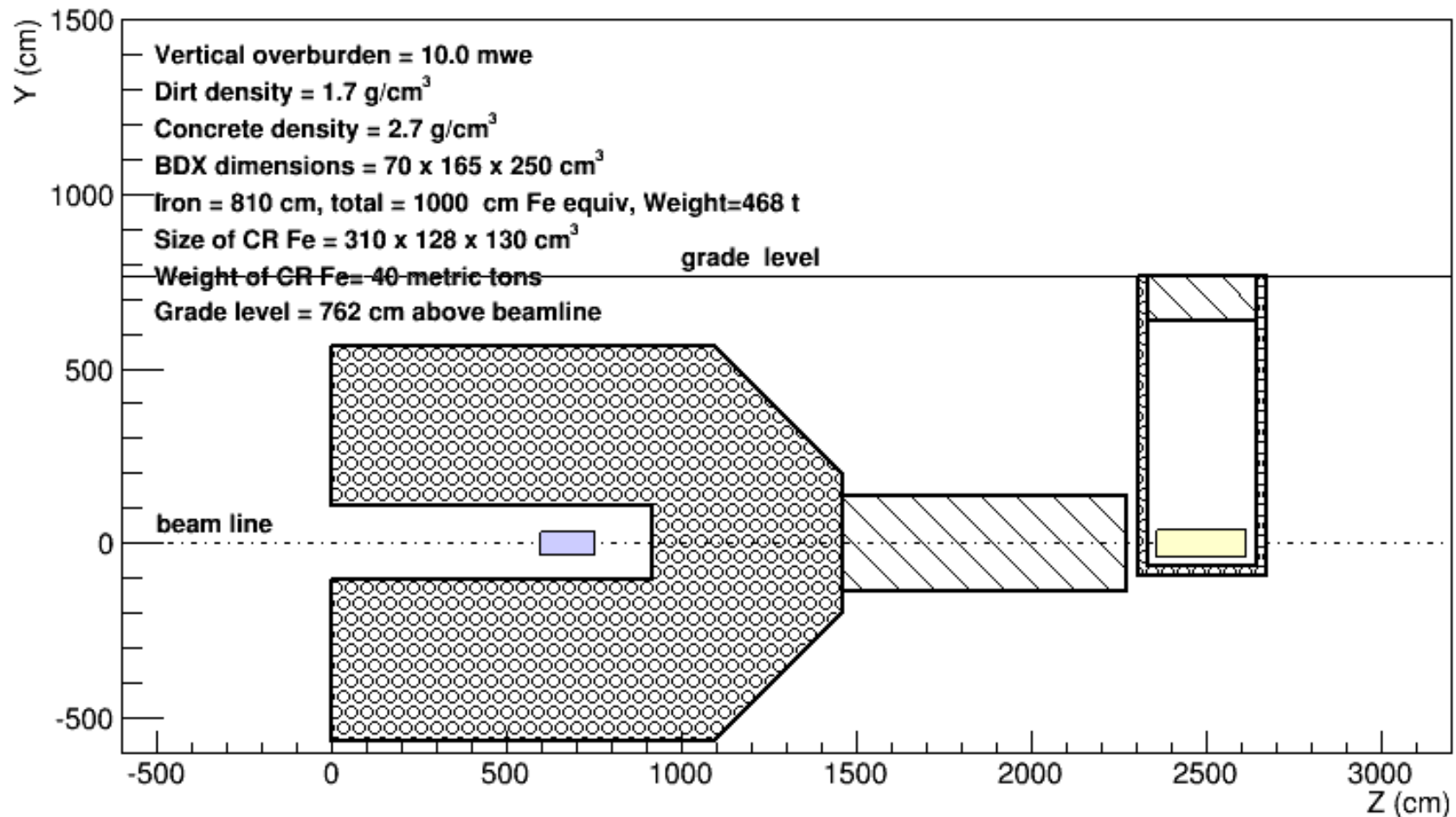
# Site layout



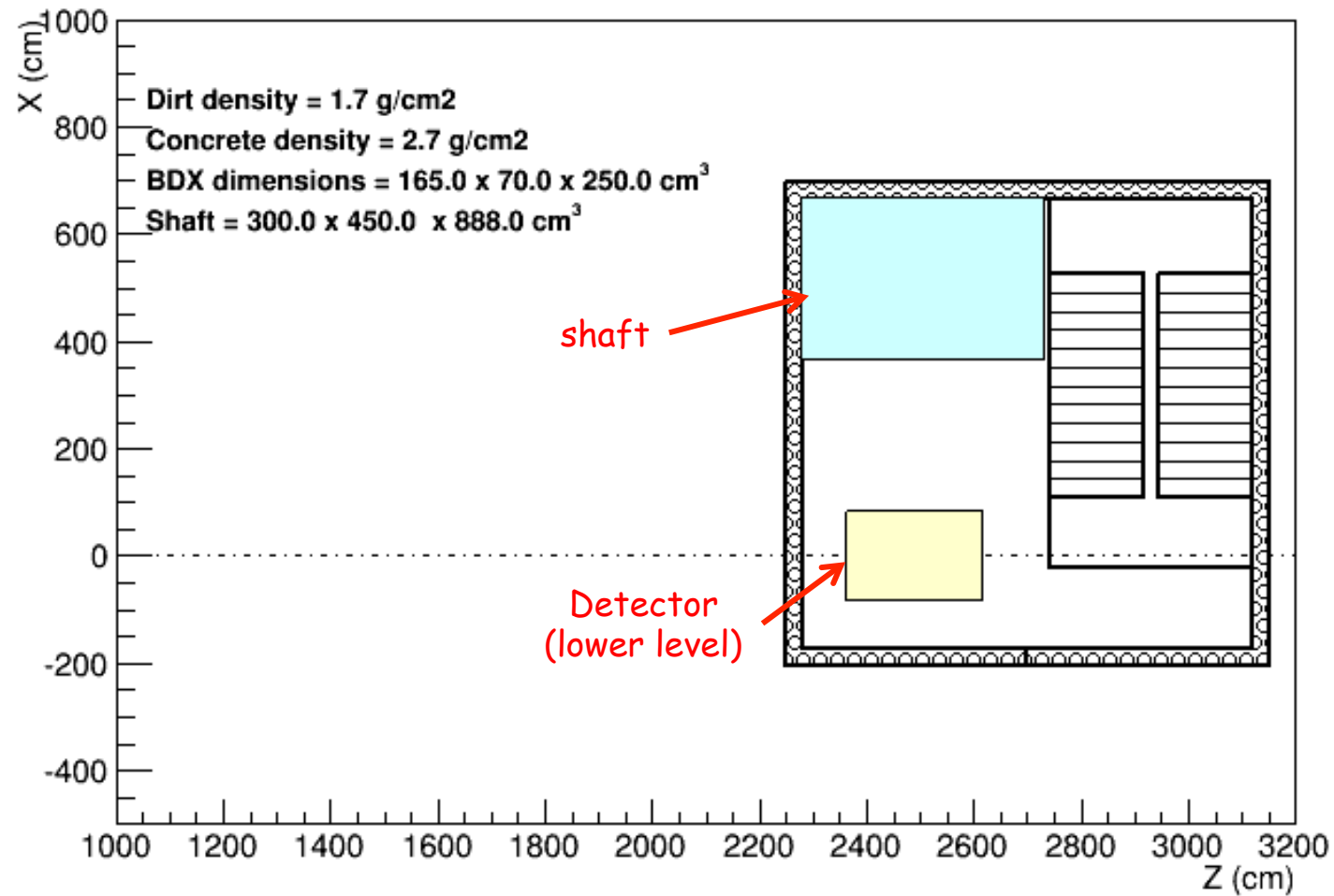


# Hall A beam dump

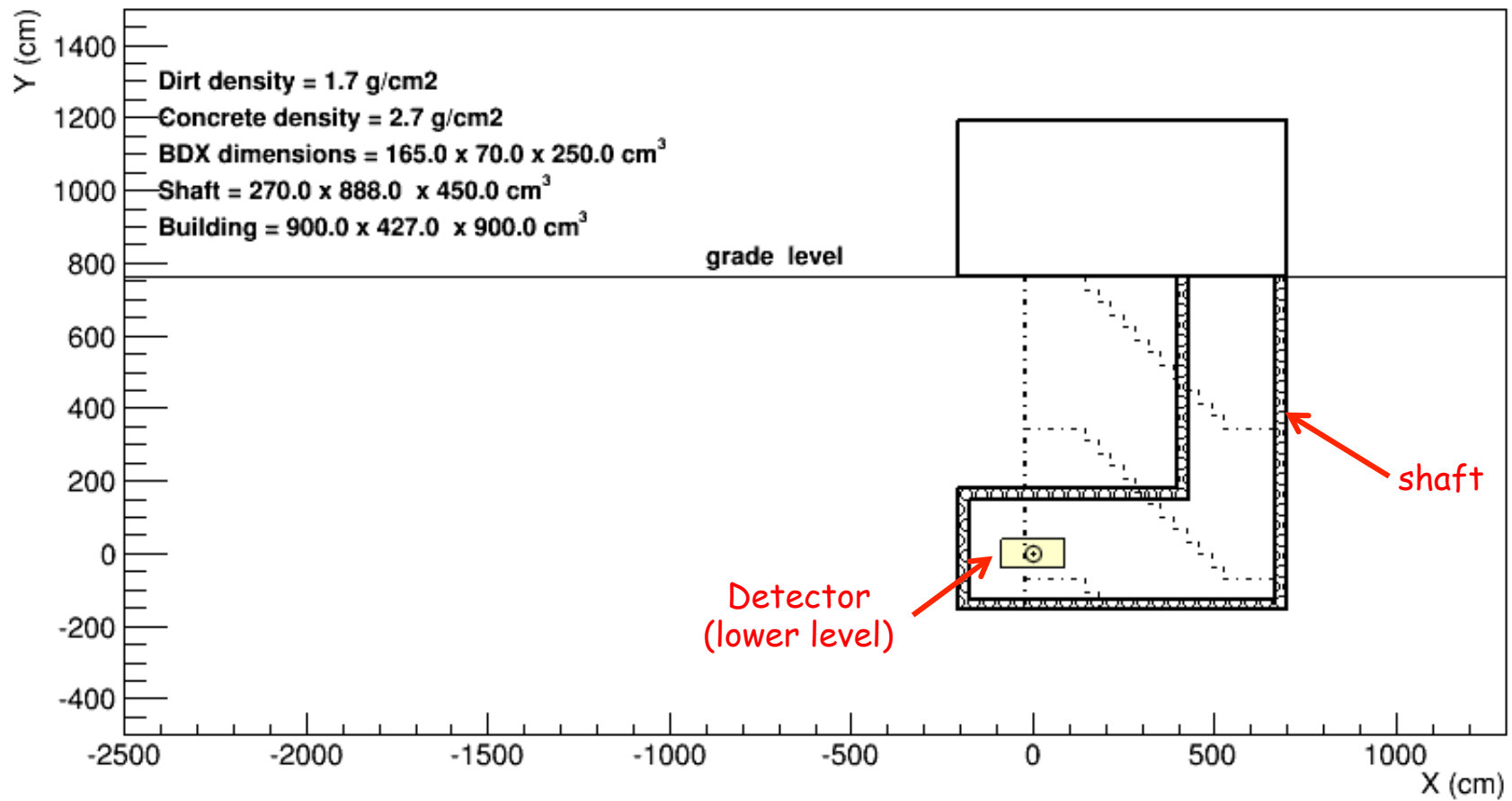
Note: Configuration for shaft and detector is not latest concept



## C1 plan for BDX



## C1 elevation for BDX



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# Cost estimate

A preliminary cost estimate was conducted based on dimensions described above and in Appendix A. The estimate is based on the cost of existing buildings, estimates for the MEIC project and RSMEANS Facilities Construction Cost Data 2015. It includes the following features

- excavation, dewatering, backfill and compaction of soil
- walls below grade, underground room at beam level
- personnel access and stairs
- above-ground building with 15 t crane
- HVAC, plumbing, piping, LCW, electrical distribution and lighting

The total estimated cost is \$1M.

WBS	Description	Height, Feet	Width, Feet	Length, Feet	Total kVA	No. of Bldgs	LCW Cooling Plant Size (kVA)
1	BDX Access building Houses power supplies & mechanical equipment Personnel & equipment access to the tunnel at Elev 11 feet; Const depth 30' Similar to North Access Building #67	14	26	32	100	1	-

Jefferson Lab - Facilities Management										
Item No.	Description	Height, Feet	Width, Feet	Length, Feet	Quantity	Units	Unit Cost	Direct Cost (\$)	Dewtr WD	Comments
1	Excavation	30	86.0	92.0	8,791	CY	5.42	47,621	7	No shoring or dewatering, Assume 30' deep, 1:1 Slope
2	Dewatering				28	Day	1,650.00	45,574		Prorate for calender days, no VOC treatment
3	Backfill w/ compaction				8,560	CY	4.22	36,157	7	Excavation minus disposed
4	Dispose of Excess Soil	30.0	13.0	16.0	231	CY	4.66	1,078		Volume of underground structure
5	6" Perforated Pipe Foundation Drain				58	LF	8.80	510		Concurrent w/ other work
6	3" Mud Slab Concrete	0.25	26.5	29.5	7	CY	191.68	1,387		3" beyond floor slab
7	Floor Slab - at tunnel level	1.5	26.0	29.0	42	CY	294.00	12,315	1	Assume SF is 50% grade level floor SF. Plus alcove
8	Walls below grade - equip access	30.0	1.5	84.0	140	CY	543.81	76,133	1	~15' x 24' area
9	Walls below grade - people access	30.0	1.5	76.0	127	CY	543.81	68,883	1	~10' x20' area
	Detector Alcove concrete	4.0	15.0	14.0	31	CY	543.81	16,919		
10	Stairs, CIP, w/ landing, with nosings				4	Flight	4,125.00	16,500		
11	Waterstop				320	LF	5.91	1,892		Walls at roof & floor
12	Waterproofing Membrane	30.0		76.0	2,280	SF	2.43	5,540	1	Walls
13	Bentonite Waterproofing	1.5	26.0	29.0	919	SF	2.40	2,205	0	Under slab
14	Protection Board	30.0		76.0	2,280	SF	2.06	4,686	1	With Membrane
15	Drain Board	1.5	26.0	29.0	919	SF	1.30	1,190	0	With Bentonite
16	Floor Slab, grade level at access	0.5	26.0	29.0	11	CY	650.00	7,270		6" slab
17	Gravel Fill w/ Compaction	1.0			3	CY	42.26	122		1' fill
18	Floor Slab on Grade, Thicken Edge				78	SF	8.90	695		6" slab
19	Floor Slab - at second floor		0.0	0.0	-	SF	7.03	-		no 2nd floor
20	Concrete Floor Sealer				1,586	SF	0.54	856		
21	Structural Steel Framed Bldg		26.0	32.0	832	SF	14.88	12,380		
22	Metal Insulated Wall Panels	14.0		116.0	1,624	SF	22.70	36,865		
23	Masonry Interior Walls	10.0		168.0	1,680	SF	14.65	24,609		includes bathroom
24	Metal Deck Roof		26.0	32.0	832	SF	1.85	1,538		



Jefferson Lab - Facilities Management									Dewtr WD	Comments
Item No.	Description	Height, Feet	Width, Feet	Length, Feet	Quantity	Units	Unit Cost	Direct Cost (\$)		
25	Insulated Roofing System		26.0	32.0	832	SF	9.86	8,204		
26	Flashing		26.0	32.0	116	LF	27.15	3,149		
27	Interior Metal Stub & GWB walls				-	SF	5.89	-		All interior walls are CMU
28	Personnel Doors				3	EA	1,762.25	5,287		
29	Overhead Service Doors				1	EA	5,425.00	5,425		
30	Railings, Steel, 3 rail				102	LF	51.50	5,253		
31	Wall Rail				60	LF	27.00	1,620		
32	Grating		26.0	32.0	83	SF	15.04	1,251		Assume 10% of floor area
33	Stair Nosings				-	EA	79.02	-		Included in stair costs
34	Firestopping		26.0	32.0	832	SF	0.43	359		
35	Sealants		26.0	32.0	832	SF	1.07	889		
36	Paint	10		284.0	2,840	SF	0.49	1,381		
37	Signage		26.0	32.0	832	SF	0.35	290		
38	Mirror				1	EA	73.00	73		
39	Soap Dispenser				1	EA	77.36	77		
40	Toilet Paper Dispenser				1	EA	36.20	36		
41	Grab Bars				3	LF	17.97	54		
42	Paper Towel Dispenser w/ Waste				1	EA	511.92	512		
43	Mop Strip Holder				1	EA	120.00	120		
44	Toilet Partitions					EA	1,158.90	-		
45	Toilet				1	EA	650.76	651		
46	Lavatories				1	EA	660.00	660		
47	Urinal					EA	742.87	-		
48	Mop sink				1	EA	848.64	849		
49	Emergency Eye Wash				1	EA	588.21	588		
50	Fire Extinguishers				2	EA	223.13	446		
51	HVAC		26.0	32.0	2,080	SF	20.20	42,012		
52	Plumbing		26.0	32.0	832	SF	4.86	4,047		
53	Cooling Towers				-	Ton	235.30	-		
54	Piping & Pumps for cooling water				-	Ton	216.34	-		
55	Cooling Water - LCW				-	gpm	1,002.41	-		
56	Fire Protection		26.0	32.0	1,664	SF	4.62	7,685		
57	Electrical - Distribution		26.0	32.0	1,664	SF	28.92	48,118		
58	Electrical - Lighting & Branch Wiring		26.0	32.0	1,664	SF	5.56	9,247		
59	Communication & Fire Alarm		26.0	32.0	1,664	SF	5.73	9,533		
60	Bridge Crane - 15 ton, 20' span				1	EA	106,140.00	106,140		
	Total - Direct Costs, 2014\$		26.0	32.0	832	SF	825.58	686,882		
	Contractor Overhead and Profit					%	20.00	137,376		
	Design Cost					%	15.00	123,639		
	Total - Contract Costs, 2014\$							947,897		

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# Summary

- We have developed a realistic civil concept for an above-ground building to install and service the BDX detector and electronics. The detector would be located in the basement at beam level.
- The service building (30'x30') would be located about 50' behind the Hall A beam dump to search for dark photons whenever there is beam.
- The estimated cost for this facility is approximately \$1M.

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# Backups



## Reference Detector / Babar crystals

