Conventional Facilities & Siting- Update

(October 31, 2005)

Conventional Facilities & Siting Global Group Activities

- Established bi-weekly video conference with Asian, European and Fermilab (CFS) colleagues
  - Coordinated a uniform sample site assessment process for each region
  - Prepared a common list of comments to the “Tom Himel’s list of Questions”
  - Prepared a draft outline for the CFS-BCD
  - Work in progress to draft CFS-BCD for each region

"*DRAFT*" CFS General Reference Parameter

1. Main Accelerator energy: 0.5 TeV cm Initial, 1 TeV cm Final
2. Main Accelerator gradient: 31.5 MV/m Initial, 35 MV/m Final
3. Main Accelerator Length: 23.6 km Initial, 44.8 km Final
4. Damping ring length: 2 @ 6.12 km circumference each, racetrack or round
5. Number of tunnels: 2 deep or, 1 near surface, with segmented surface support buildings
6. Beam line alignment: segmented straight sections to follow earth's curvature or laser straight
7. Crossing angles: 20 mrad and 2 mrad
8. Number of IRs: 1 or 2 Initial, 2 Final
9. Vibration criteria: TBD

America's Region Siting Activities

- Partnering with engineers at Fermilab, developed methods and compared several potential locations for a sample site in Northern Illinois
- Compared the salient features of each location in the site assessment matrix
- *Following is a top level list of criteria that have been considered:*
  - Site Impacts on critical Science Parameters
  - Scientific/Institutional Support Base
  - Land Acquisition
  - Environmental Impacts
  - Construction Cost Impacts
  - Operation Cost Impacts
  - Environmental, Safety & Health
  - Regional Infrastructure Support
  - Risk Factors

America's Region Siting Activities

Site A													
				Site A		Site B		Site C		Site D		Site E
1	**Site Impacts on Critical Science Parameters**												
1A	Configuration (Physical Dimensions and Layout)												
.1	Usable length and width		0	48 km	0	48 km	0	48 km	0	48 km	0	48 km
.2	Flexibility for Adjustment of Alignment												
	.a Adaptable to Laser Straight		1	YES	1	YES	1	YES	1	YES	-1	NO
	.b Adaptable to Earth Curvature		1	YES	1	YES	-1	NO	-1	NO	1	YES
.3	Depth of Tunnel		1	77m (250ft)	1	120m (320ft)	-1	12m (40ft)	-1	23m (75ft)	-1	48m (160ft)
.4	Depth of Interaction Halls		1	106m (350ft)	1	152m (500ft)	-1	9m (30ft)	-1	18m (60ft)	-1	85m (280ft)
.5	Accessibility to Tunnels		0	Vertical shafts	0	Vertical shafts	0	Vert. Shafts and drop hatches	0	Vert. Shafts and drop hatches	0	Vert. Shafts and drop hatches
1B	Performance (Vibration and Stability												
.1	Natural Vibration/Noise Sources												
	.a Geologic Dynamic Properties		1	3 distint rock layers	1	3 distint rock layers	0	till only	0	till only	0	one layer of various rock
	.b Seismic		1	Zone "0"	1	Zone "0"	1	Zone "0"	1	Zone "0"	1	Zone "0"
	.c Volcanoes		1	None	1	None	1	None	1	None	1	None
	.d Rivers		1	0 rivers/0 streams	1	0 rivers/3 streams	0	0 rivers/12 streams	-1	3 rivers/7 streams	-1	1 rivers/7 streams
	.e Water Falls		1	None	1	None	1	None	1	None	1	None
.2	Cultural Vibration/Noise Sources												
	.a Active Railway		0	4	-1	6 perp/4 parallel	0	4	1	2	1	3
	.b Main Highway		0	5	0	6	-1	6	1	4	1	3
	.c Active Quarries		0	several	0	few	0	few	0	few	0	several
	.d Other Major Man Made Activities		0	unlikely	-1	likely	0	unlikely	0	unlikely	0	unlikely
			9		7		6		2		2	
2	**Scientific /Institutional Support Base**												
2A	Proximity to a High Energy Physics Laboratory		0	31km/19 miles	1	0	-1	76km/47 miles	-1	55km/34 miles	-1	51km/32 miles
2B	Proximity to a Major Related Federal Research Laboratory		0	80km/50 miles	1	50km/31 miles	-1	129km/80 miles	0	71km/44 miles		93km/57 miles
2C	Proximity to Major Educational or Science Institution		1	15km/9 miles	0	48km/30 miles	-1	50km/31 miles	-1	82km/51 miles	1	27km/17 miles
			1		2		-3		-2		0	
3	**Land Acquisition**												
3A	Land Availability Along the Alignment		1	mostly rural - property acquistion concentrated at shafts	1	suburban-light commercial, potential to locate in undeveloped areas and utility ROW, property acquisition concentrated at shafts	-1	mostly rural, requires acquisition along entire length	-1	rural, requires acquisition along entire length	-1	mostly rural, requires acquisition along entire length
3B	Estimate # of Land Ownership Along the Alignment		1	population: < 100 per square mile	0	population: 1000-3000 per sqmi outside of ROW	1	population: < 100 per square mile	0	population: 100-1000 per sqmi	1	population: < 100 per square mile
3C	Land Cost		1	farmland	0	mixed suburban and light commercial	1	farmland	1	farmland and rural residential	1	farmland
3D	Future Development Impact		-1	urban sprawl in 10-15 years	1	none	1	minimal for 30-50 years	-1	north end during construction	1	minimal for 30-50 years
3E	Usage of Surface		0	agricultural	0	residential and light commercial	0	agricultural	0	farmland and rural residential	0	agricultural
3F	Within A Single Governing Body		0	2 counties; 1 state	0	3 counties; 1 state	0	3 counties; 1 state	0	2 counties; 1 state	0	3 counties; 1 state
3G	Support of Government		0	anticipated	0	anticipated	0	anticipated	0	anticipated	0	anticipated
3H	National Parks		0	none	0	none	0	none	0	state park	-1	none
3I	Sub-surface Easement Availability		0	not available	1	yes existing available	0	not available	0	not available	0	n/a
3J	Underground Land Ownership		0	by owner	0	by owner	0	by owner	0	by owner	0	by owner
			2		3		2		-1		1	
4	**Environmental Impacts**												
4A	Surface Impact		1	concentrated at shafts	1	concentrated at shafts	-1	mostly rural - prime farmland - crosses 4 major roadways	-1	rural - crosses 5 major roadways	-1	mostly rural - crosses 2 major roadways
.1	Wetlands & other Waters of the State		0	lies beneath 0 rivers/0 streams	1	Lies beneath 0 rivers/3 streams	-1	crosses 0 rivers/12 streams	-1	crosses 3 rivers/7 streams - IP is at a river Crossing	0	1 rivers/7 streams
.2	Protected Lands		1	Coon Creek Wetlands (fen)	1	Fen near Elgin	-1	copious wetlands	-1	special flood protection at Morris	-1	many wetlands
.3	Endangered Species		1	concentrated at wetlands	1	concentrated at wetlands	-1	concentrated at wetlands	-1	concentrated at wetlands	-1	concentrated at wetlands
.4	Permitting Complexity		0	TBD	0	TBD	0	TBD	0	TBD	0	TBD

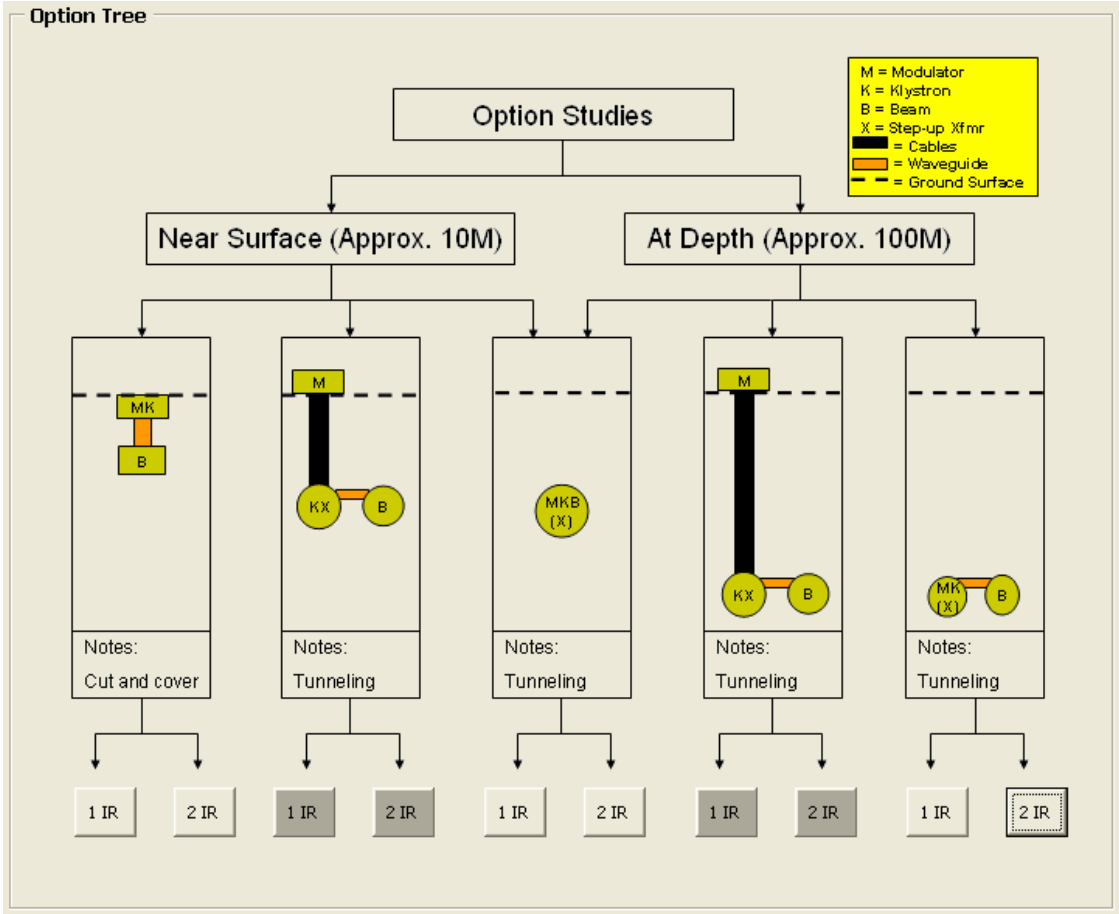
Fred Asiri

Excerpt from the site assessment matrix

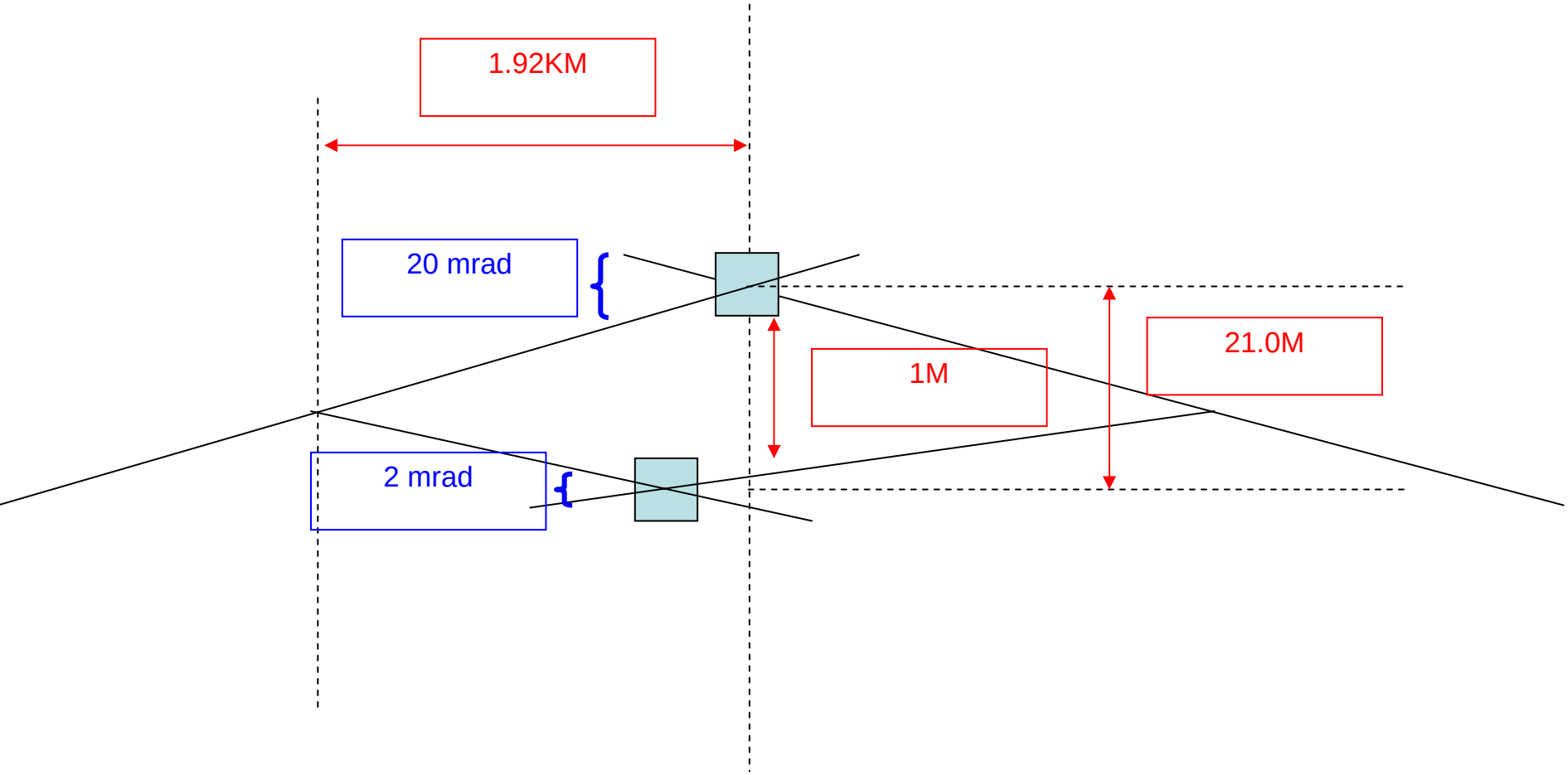
Civil Option Studies Activities

– *Following is a list of the option studies under consideration:*

1. Crossing angles and dumps arrangement
2. Number of IR's (one vs. two)
3. Single IR with two push-pull detectors
4. Linac tunnel depth and methods of construction
5. Linac tunnel and service tunnel arrangement

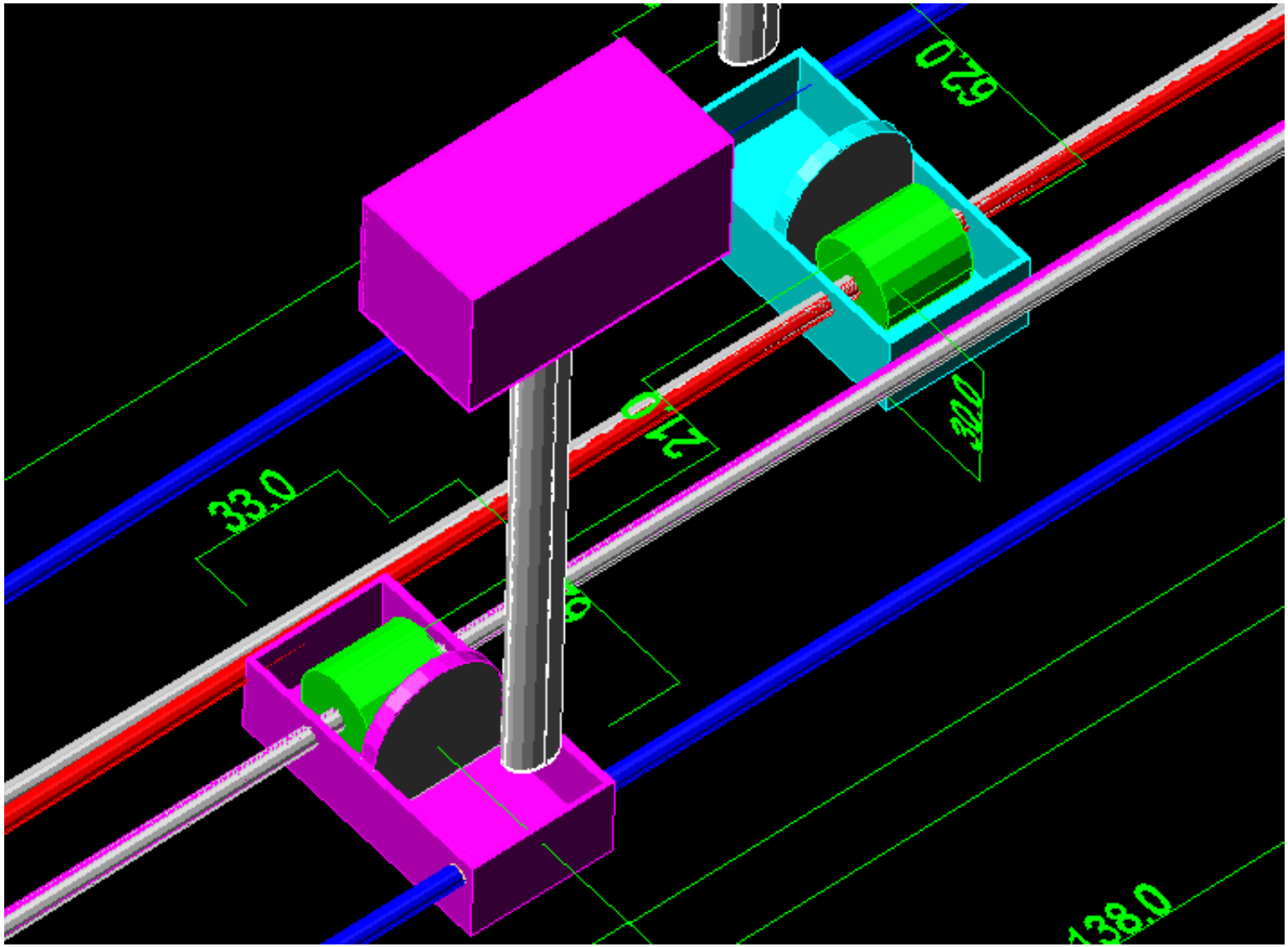


BDS & IR Option Studies

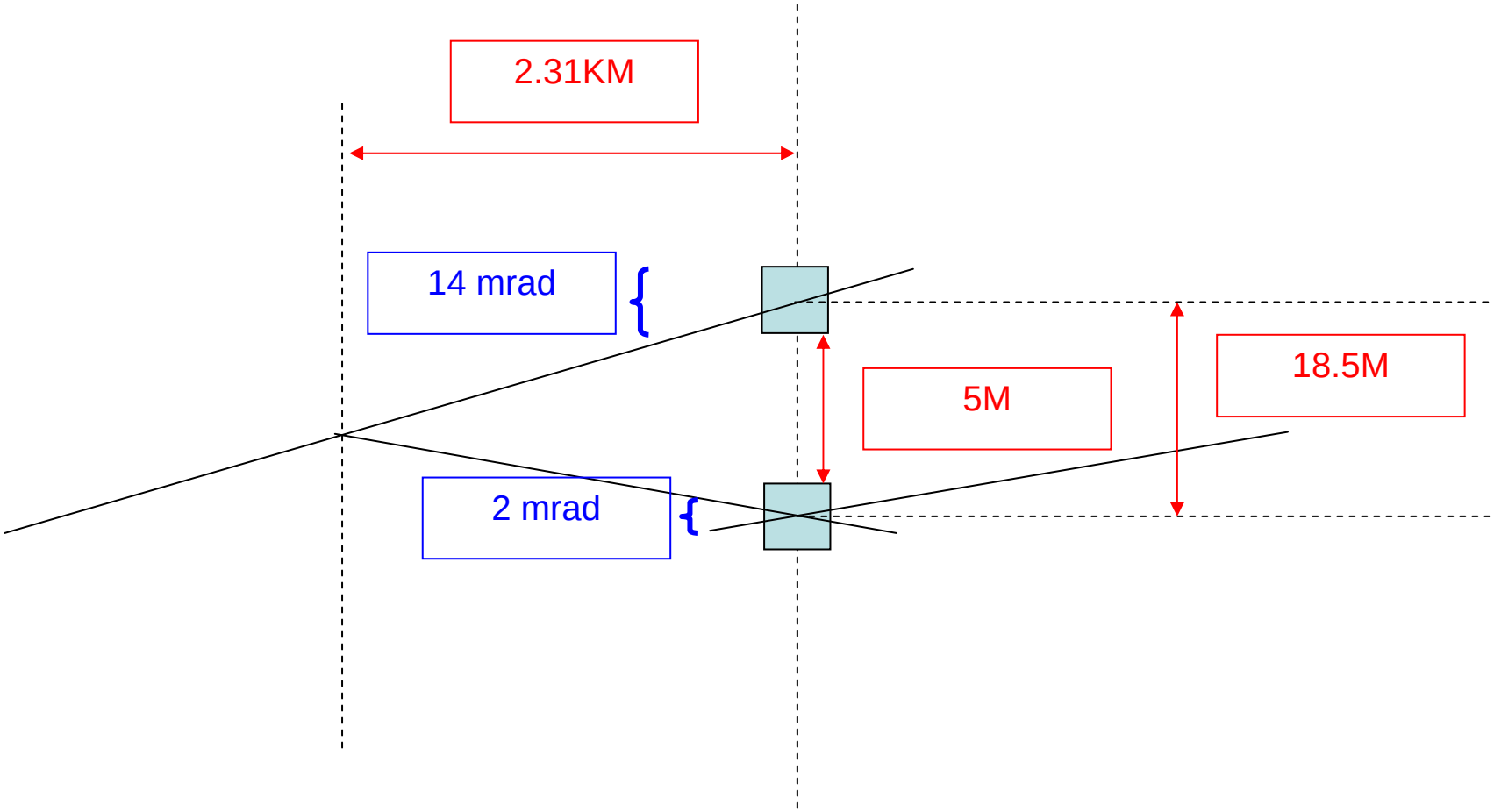


Baseline: 20 mrad and 2 mrad
With two IRs each with detector Ø=~20m

BDS & IR Option Studies

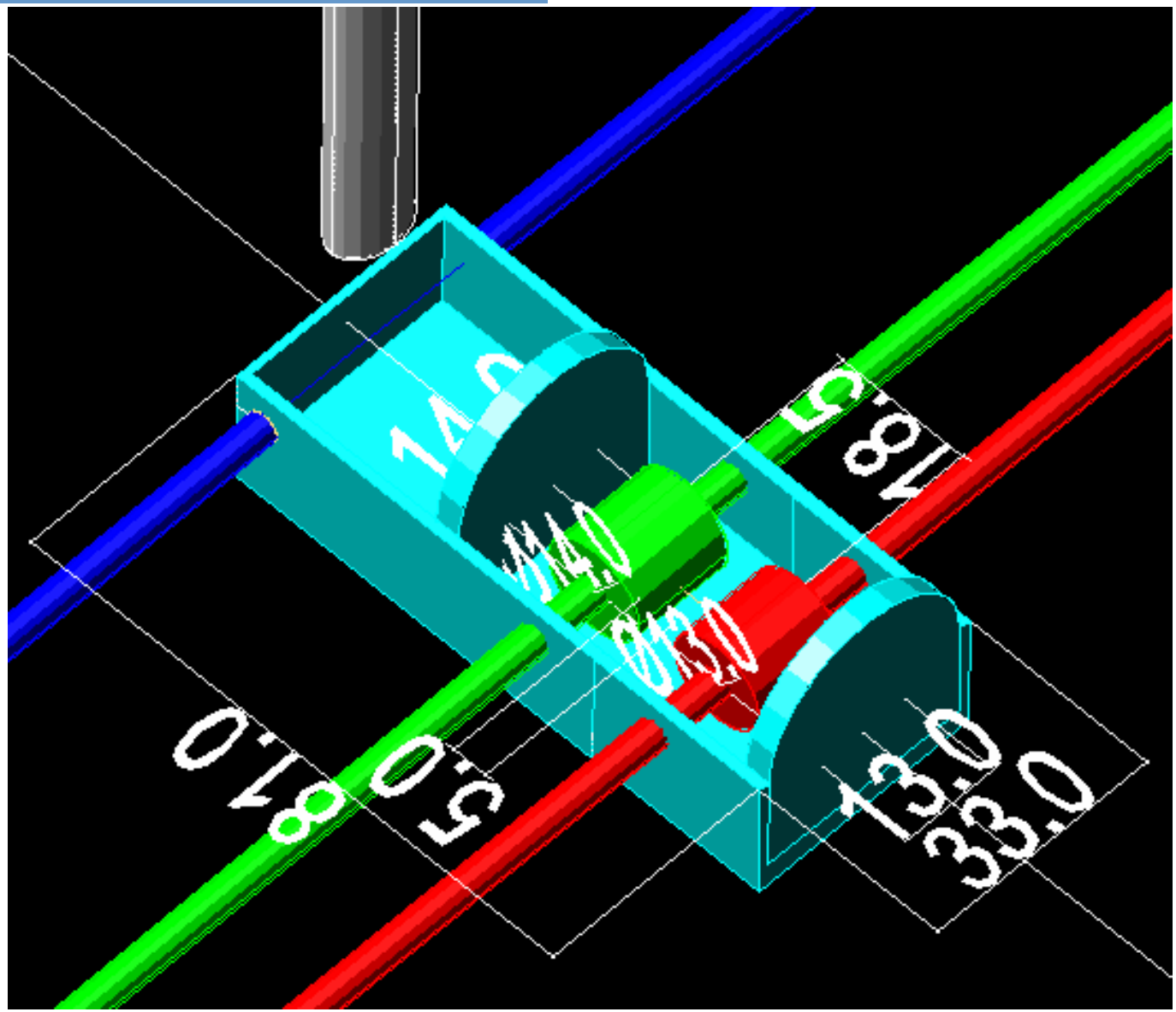


BDS & IR Option Studies

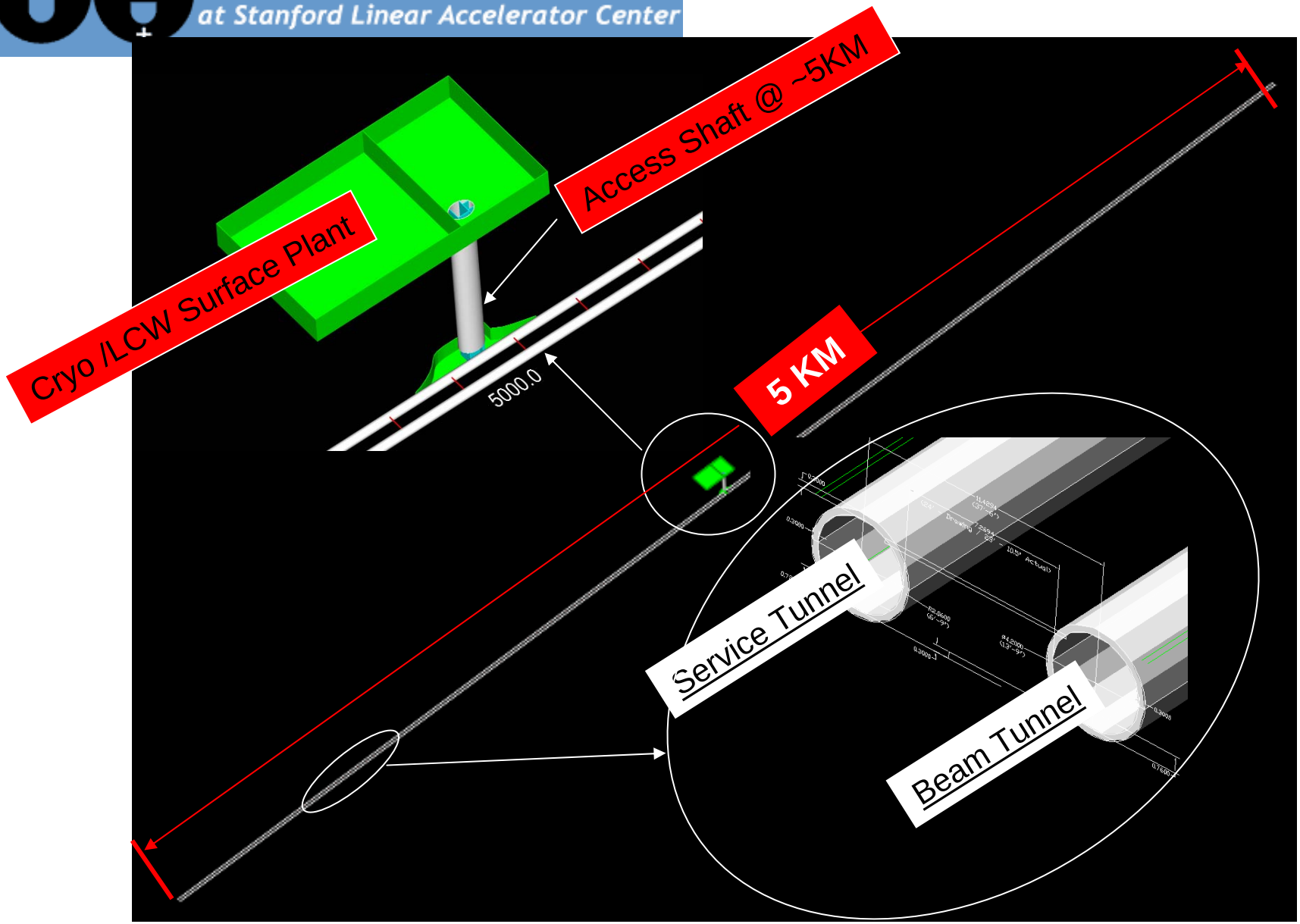


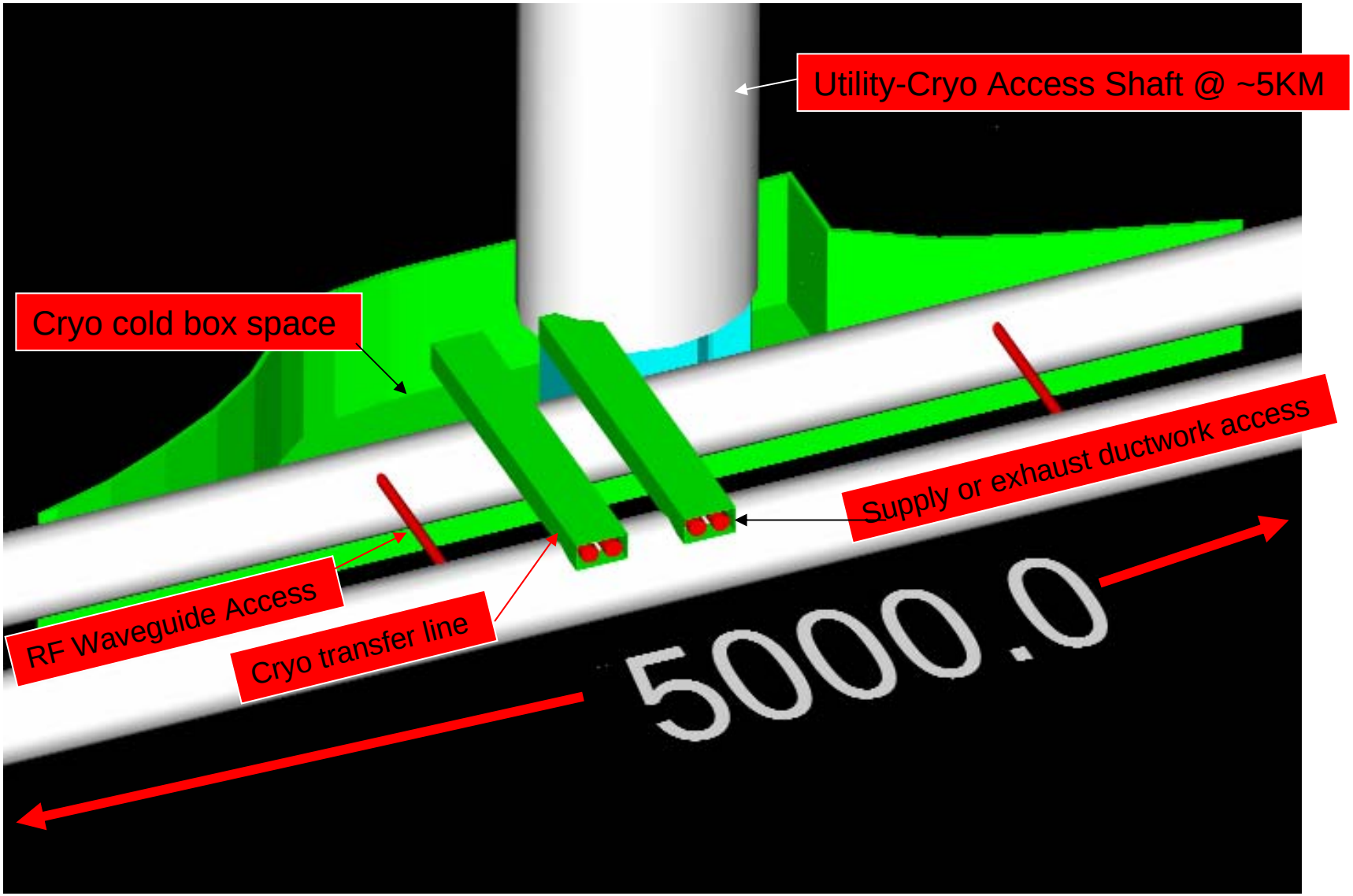
BDS & IR Option: 14 mrad and 2 mrad
With one IR and two detectors (Ø=14m & Ø=13m)

BDS & IR Option Studies



Linac Sector Option Studies




Utility-Cryo Access Shaft @ ~5KM
Cryo cold box space
Supply or exhaust ductwork access
RF Waveguide Access
Cryo transfer line
5000.0