Coordinate system for the GIF as defined for CMS RPCs

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13 Oct 2015

Aims

- Establish 2 measured parameters to readily keep up to date the diagram of the chamber positions in the GIF++.

- Establish the coordinates of the chamber position with respect to the source and nominal beam positions.

Contents

- Defining the coordinate systems

- Base Bunker diagram (no details, gas panels etc)

- Trolley specification, with present chamber position.

Our chambers have potentially 6 degrees of freedom.

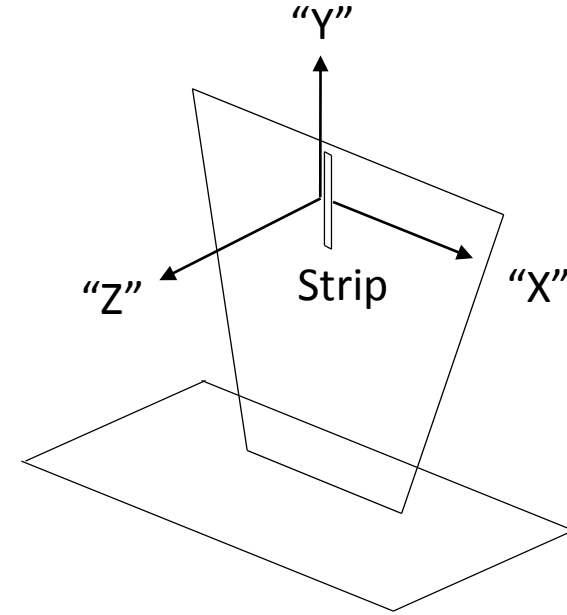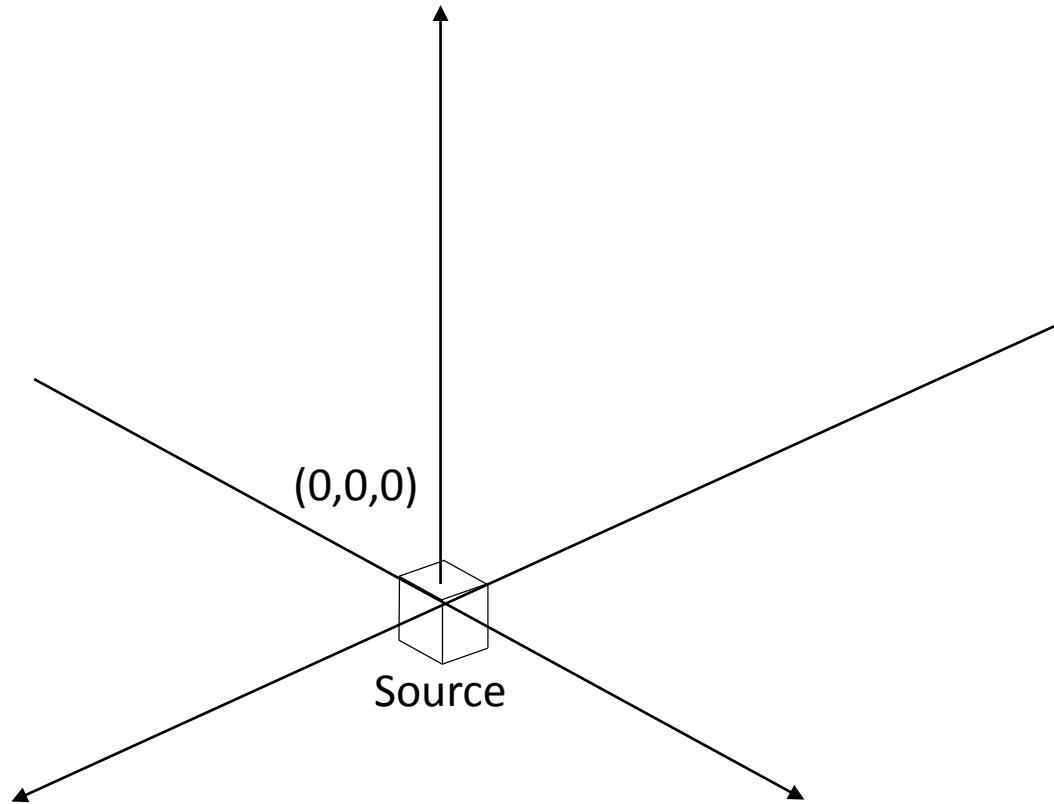We will only deal with translations and no rotations
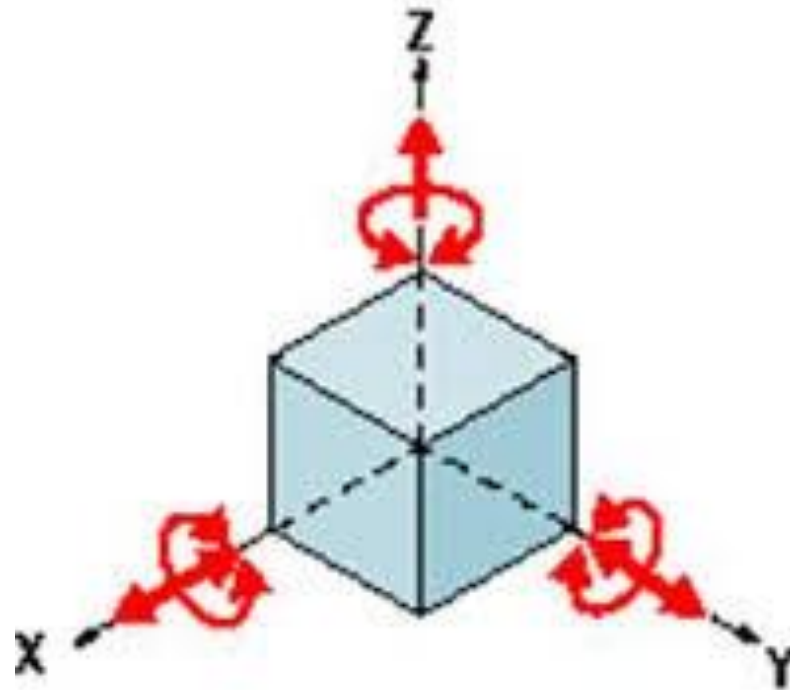
Steps to defining the strip position

- Measurement of each trolley position (X,Z) within the Bunker volume.
- Definition of each chamber in the trolley, (X,Y,Z)
- Definition of each strip or eta division within the chamber structure.

- Nota the case of the rolling chambers in T0/3 must be defined wrt the trolley and or the Jura wall for each "X" position.
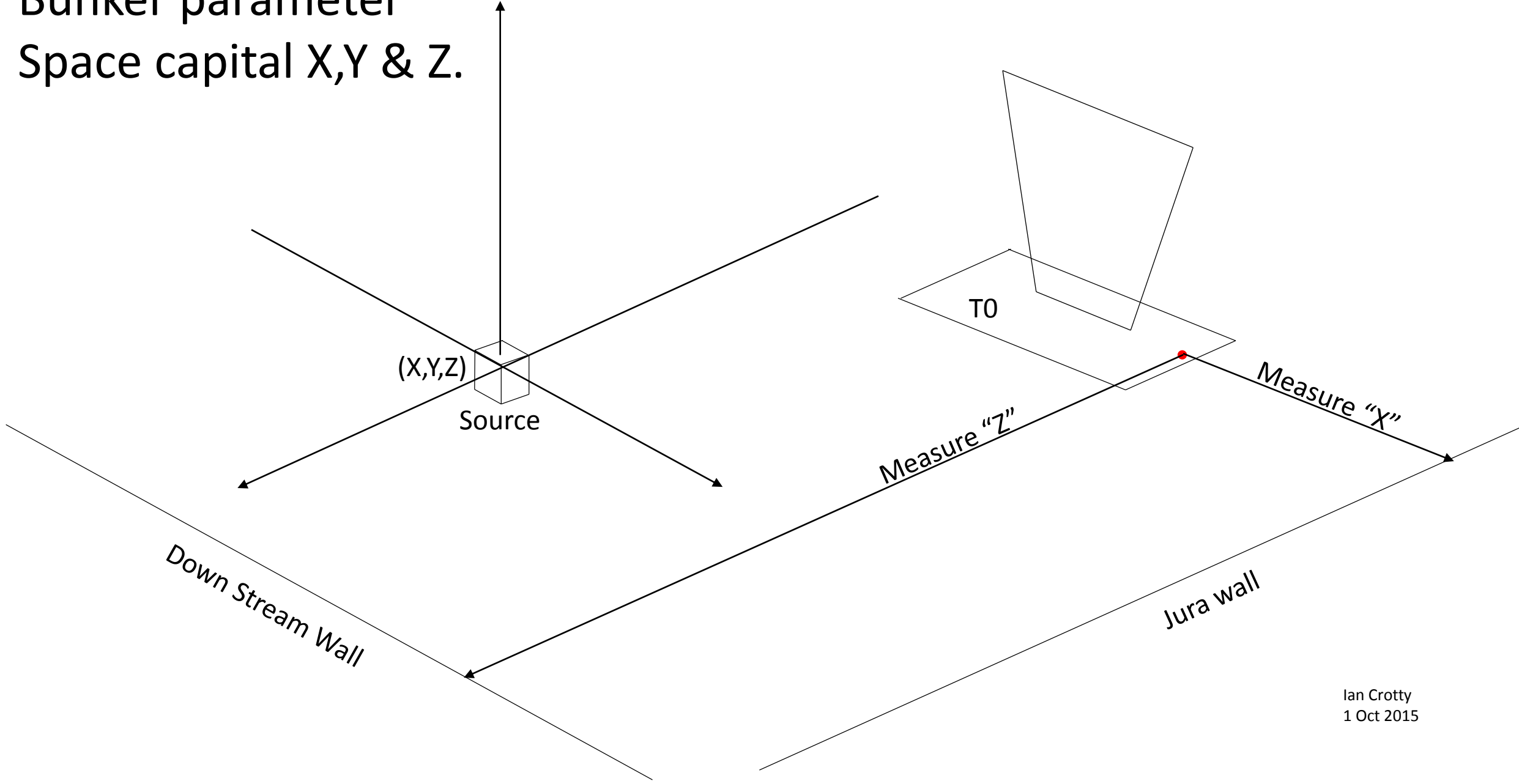
Diagrams and Referentials

- Diagram defining the possible positions of the trolleys within the bunker, constrained by cable trays, Gas PP, rails for TGC shielding etc.

- First establish base diagram of Bunker & infrastructure for establishing chamber position wrt the beam and source .

- Second referential points on the trolleys wrt the source centre.

- Third the location of the chambers wrt ref point on the trolleys.

- Fourth the position of the strips wrt the trolleys.

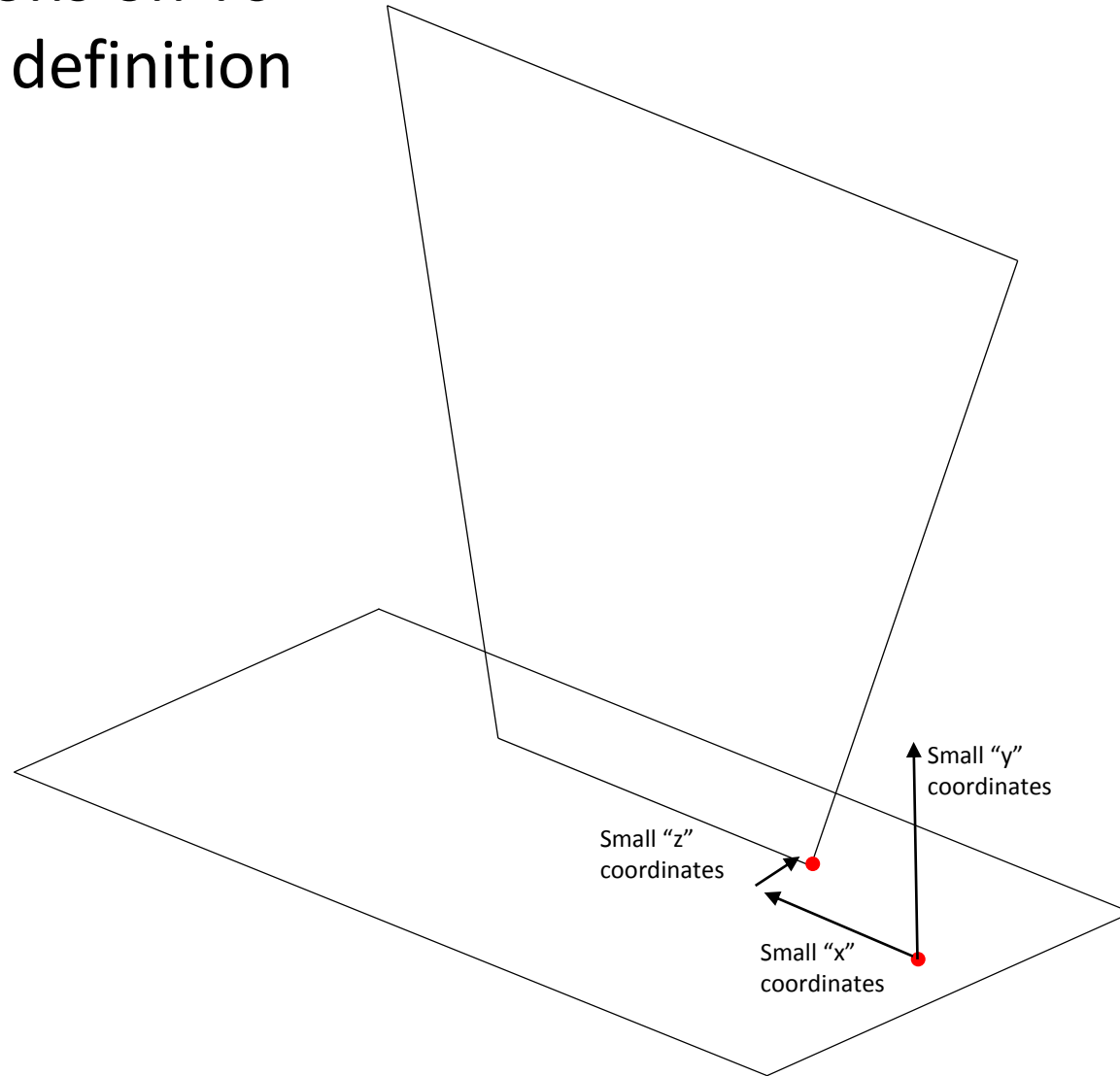# Final strip spacial definition with respect to Source in X,Y & Z.

"Y"

"Z"   Strip   "X"

(0,0,0)

Source

Bunker parameter
Space capital X,Y & Z.

(X,Y,Z)

Source

T0

Measure "X"

Measure "Z"

Down Stream Wall

Jura wall

Ian Crotty
1 Oct 2015

Chamber positions on T0
2nd Co-ordinate definition

Small "y" coordinates

Small "z" coordinates

Small "x" coordinates

Strip positions on chamber
3nd Co-ordinate definition

Small "z" coordinates

Small "y3" coordinates

Small "x" coordinates

Final strip spacial definition with respect to Source in X,Y & Z.

(0,0,0)

Source

"Y"

"Z"
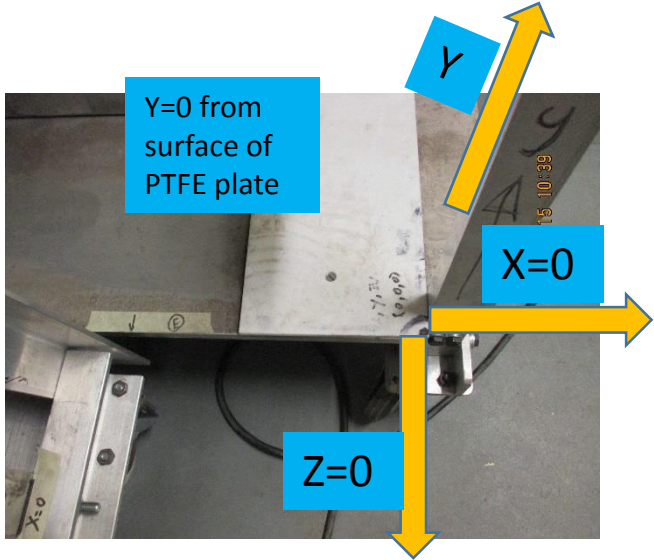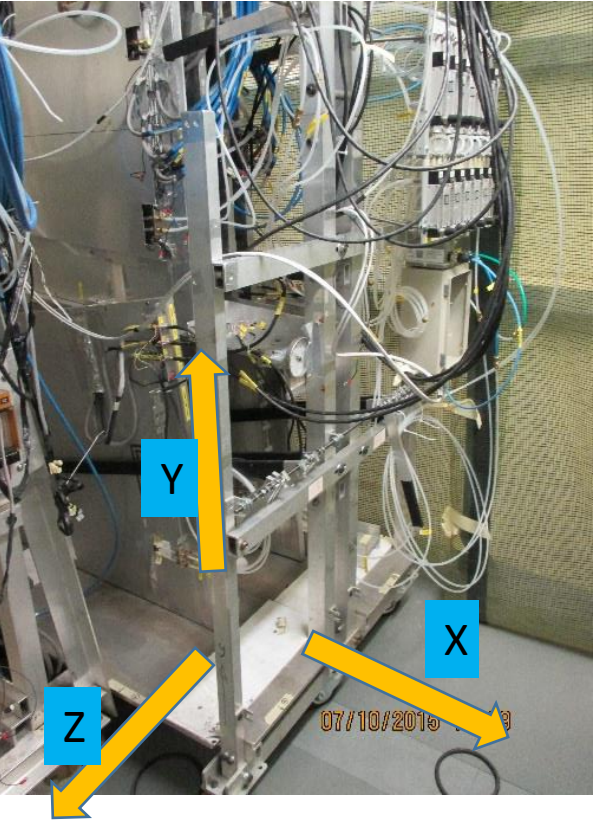
Strip

"X"

Ian Crotty
1 Oct 2015
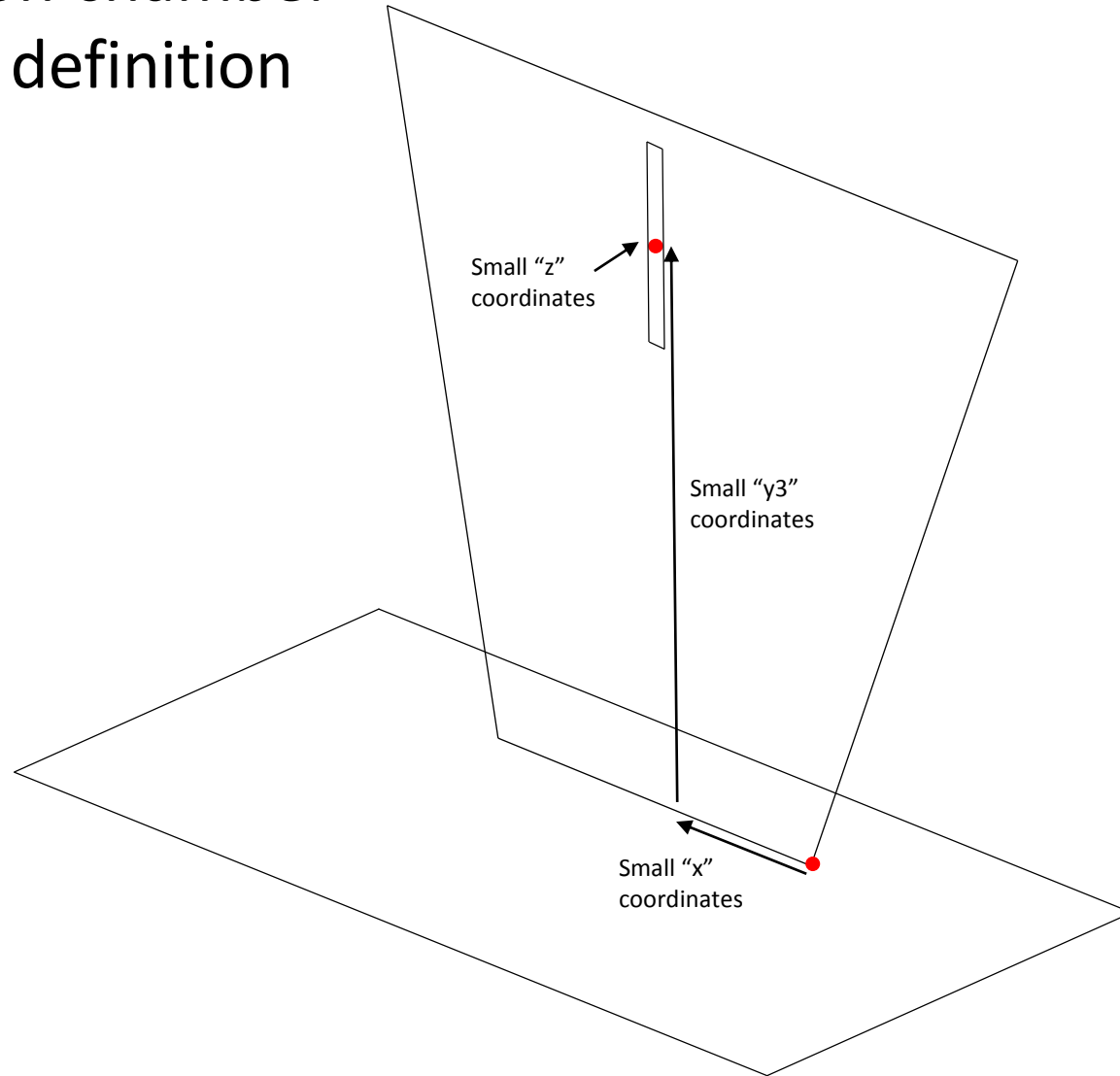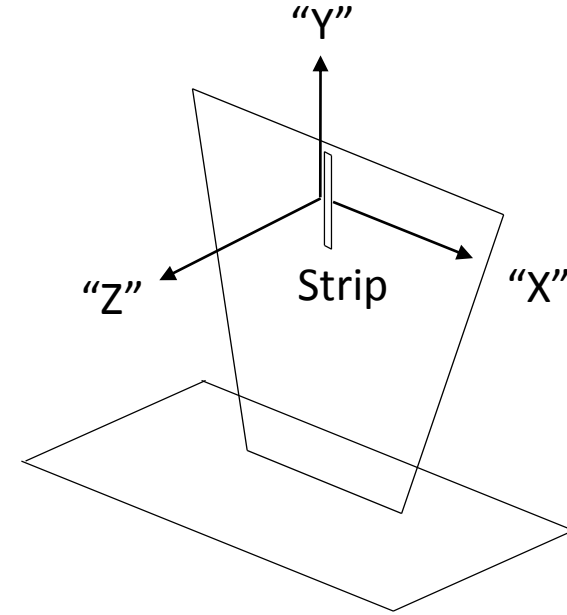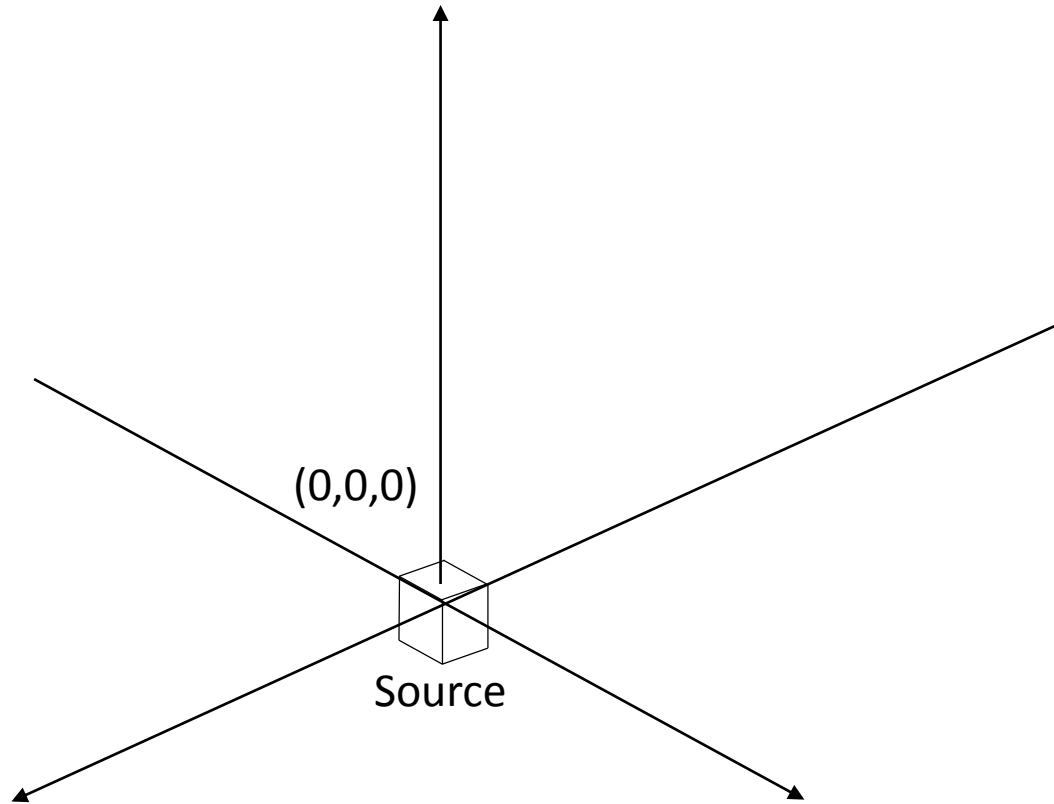
Base diagram of facility

- X = 0 @ Centre of source positive values are towards Jura with the source at 2748 + 530mm = 3278mm from Jura wall.

- Y = 0 @ Centre of source positive values upwards.

- Z = 0 @ Centre of source positive values are down stream.

- Nominal Beam and source are 1640mm above steel floor (LHC ref 2060mm above 887 hall floor).

- Source aperture open angle = 74degrees.

- Bunker height upstream 4386mm

- Bunker height down stream 5183mm

Base diagram

- 12025
- 2748
- 4825
- 6177
- BEAM
- +X
- Source
- +Z
- 730
- 1545
- Nominal Beam Line
- 1530
- 2800
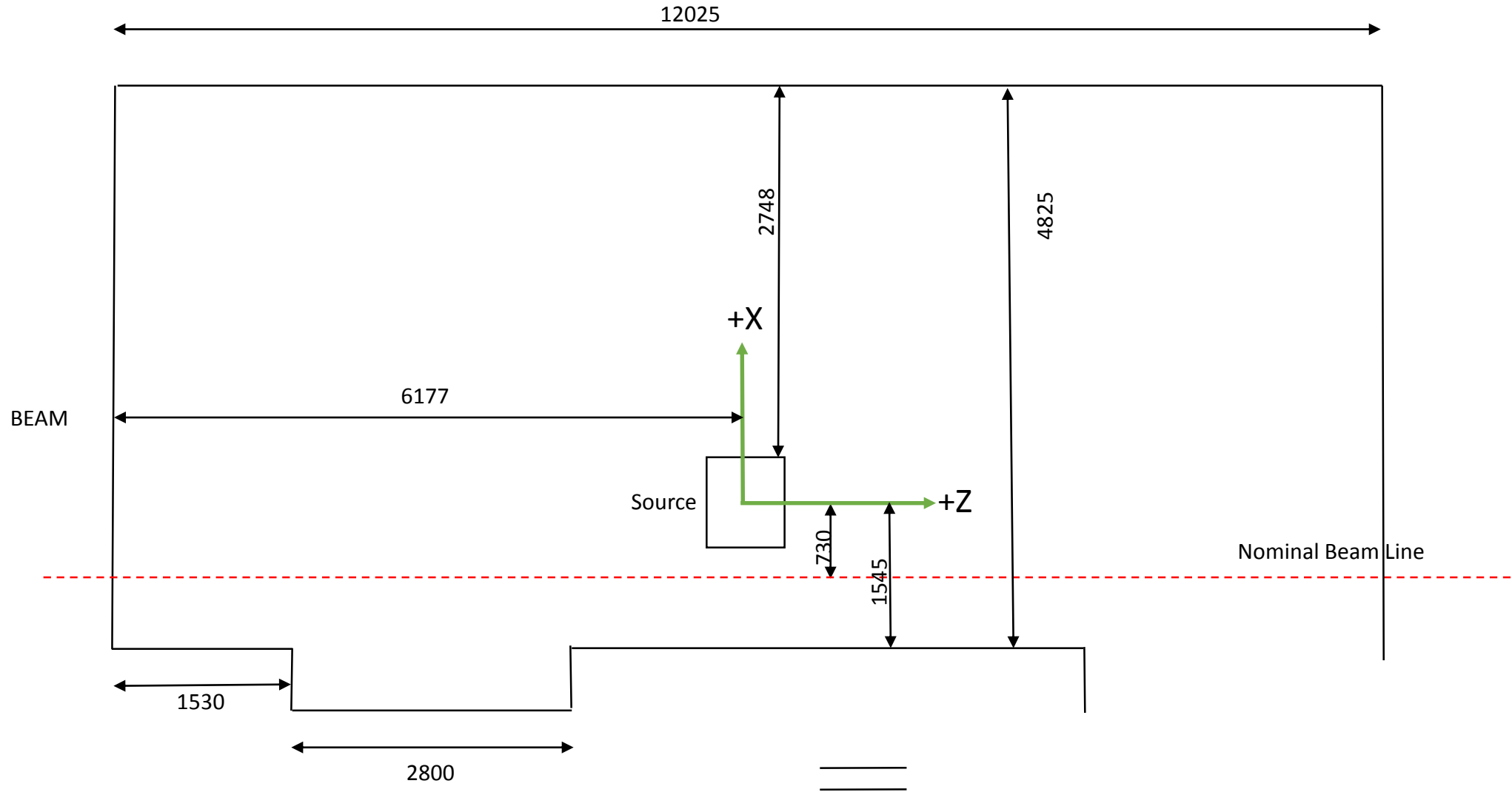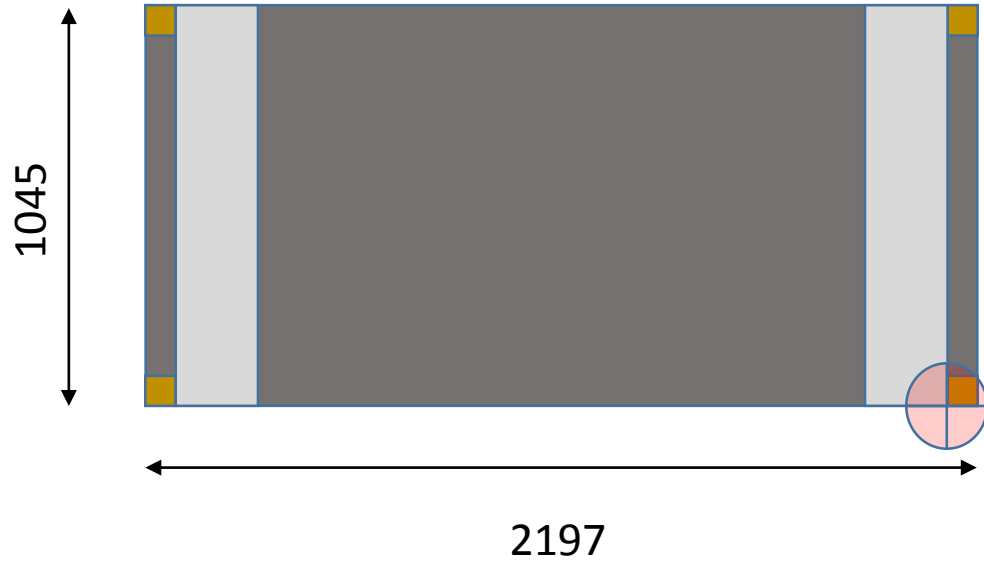
Trolley T1 specifications and ref points

T1 zero ref points and chamber positions

1045

2197

Represents (0,0,0)

Position in Z ??

360

1378

1383

Height 282
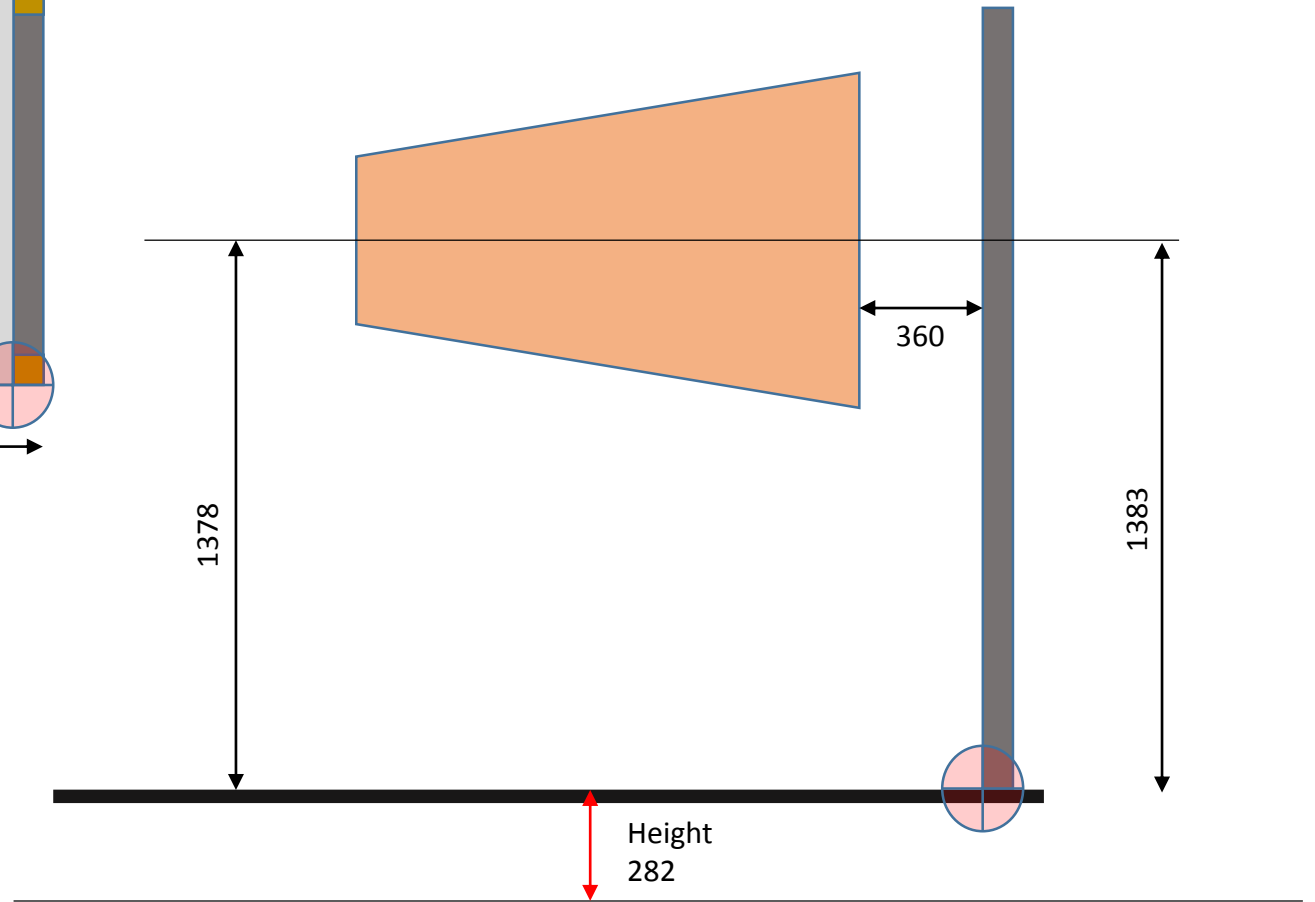
Values in Z for T1

Represents (0,0,0)

165
166
Gap 2

270 ± 3mm
120mm
530
487
317mm
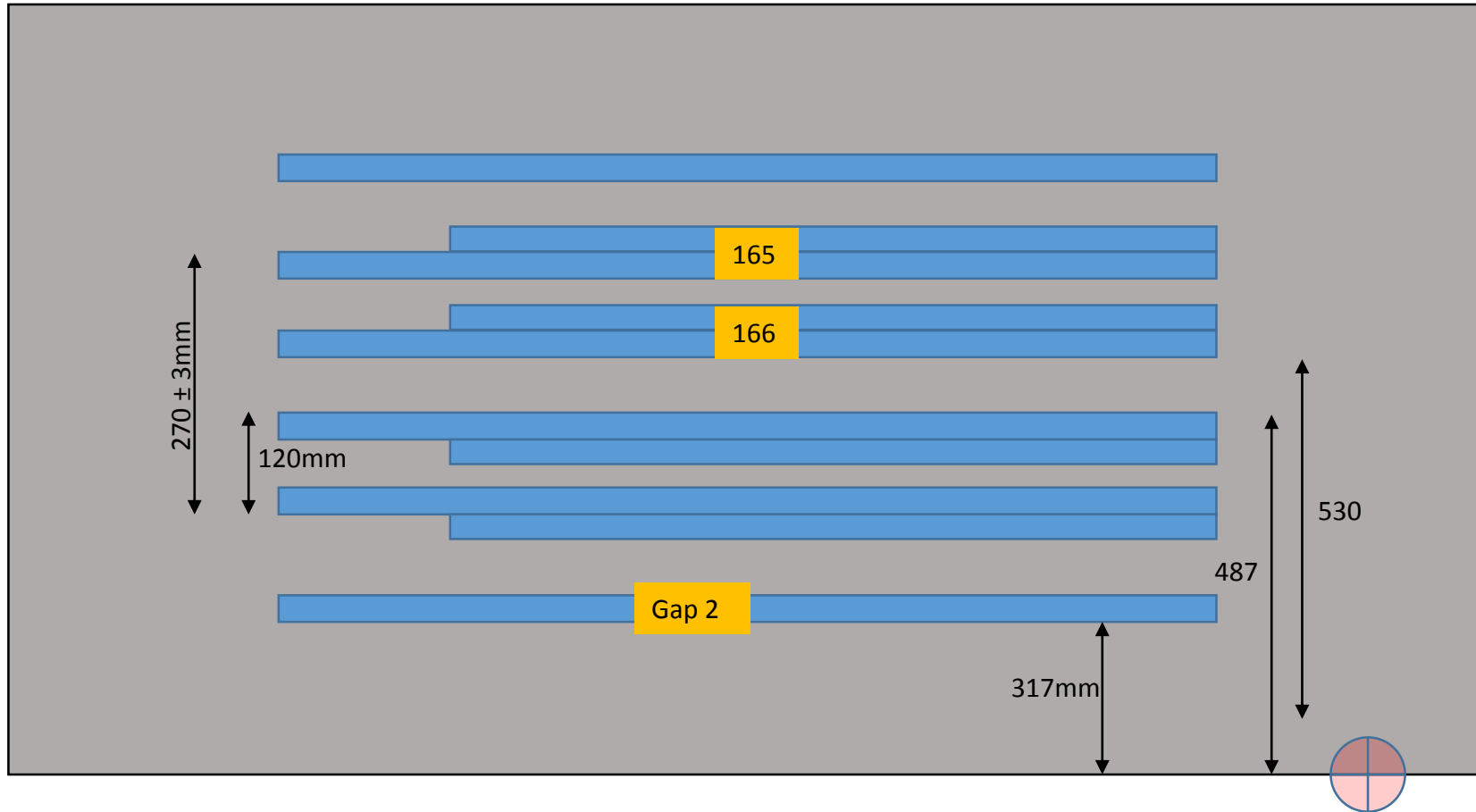
Trolley T0 specifications and ref points (1)

T1

T0
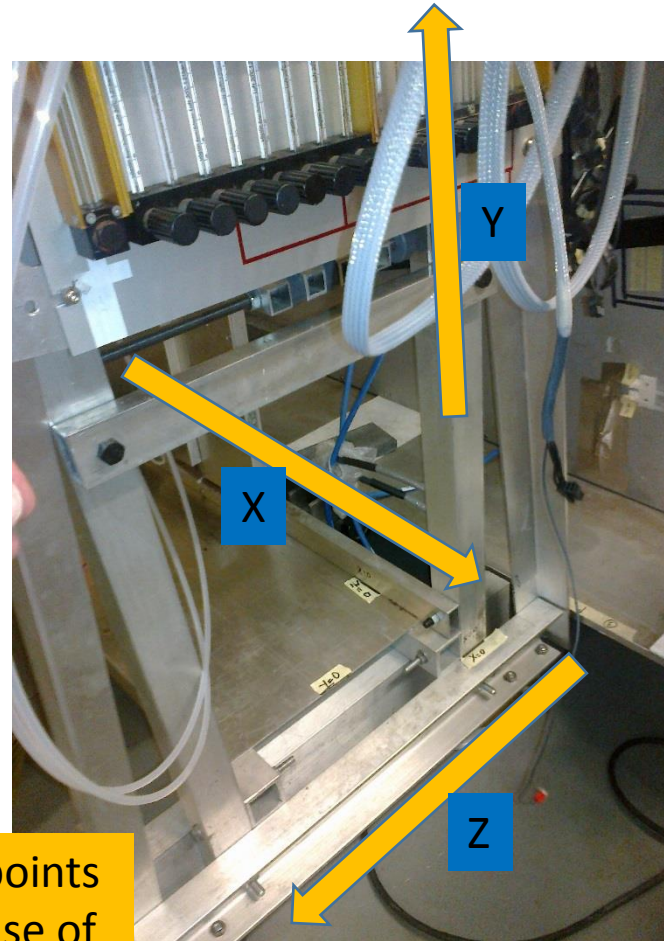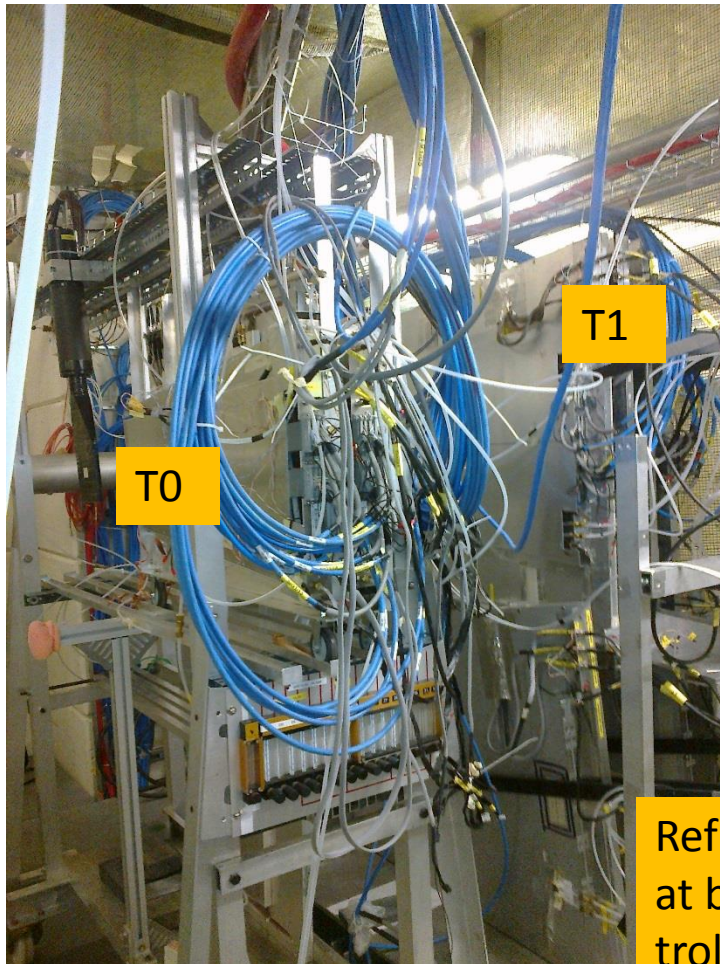
Ref points at base of trolley T0

Y

X

Z

Z=0

Y=0

X=0
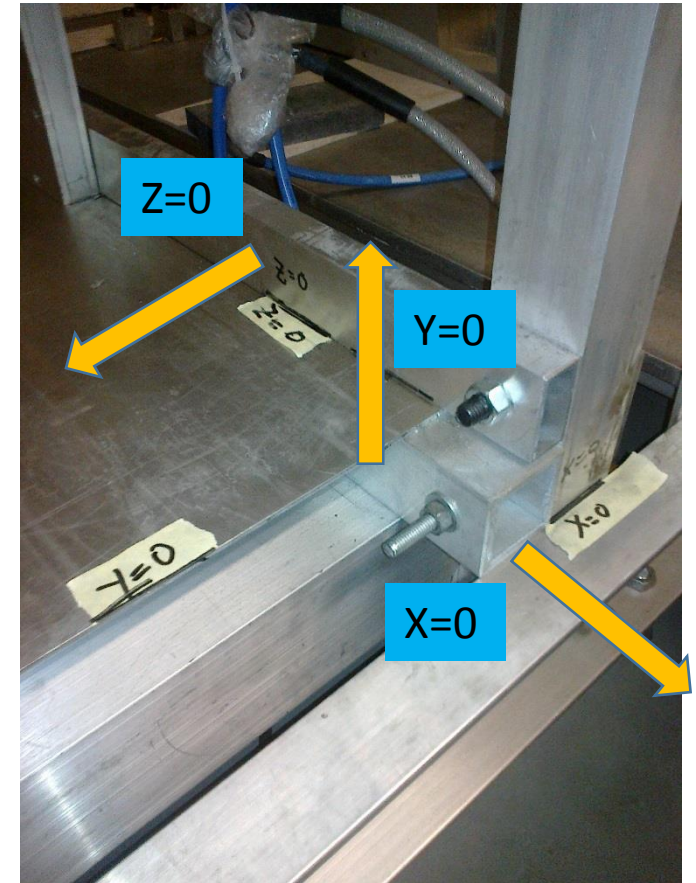
T0/3

Represents
(0,0,0)

160

1650
± 1
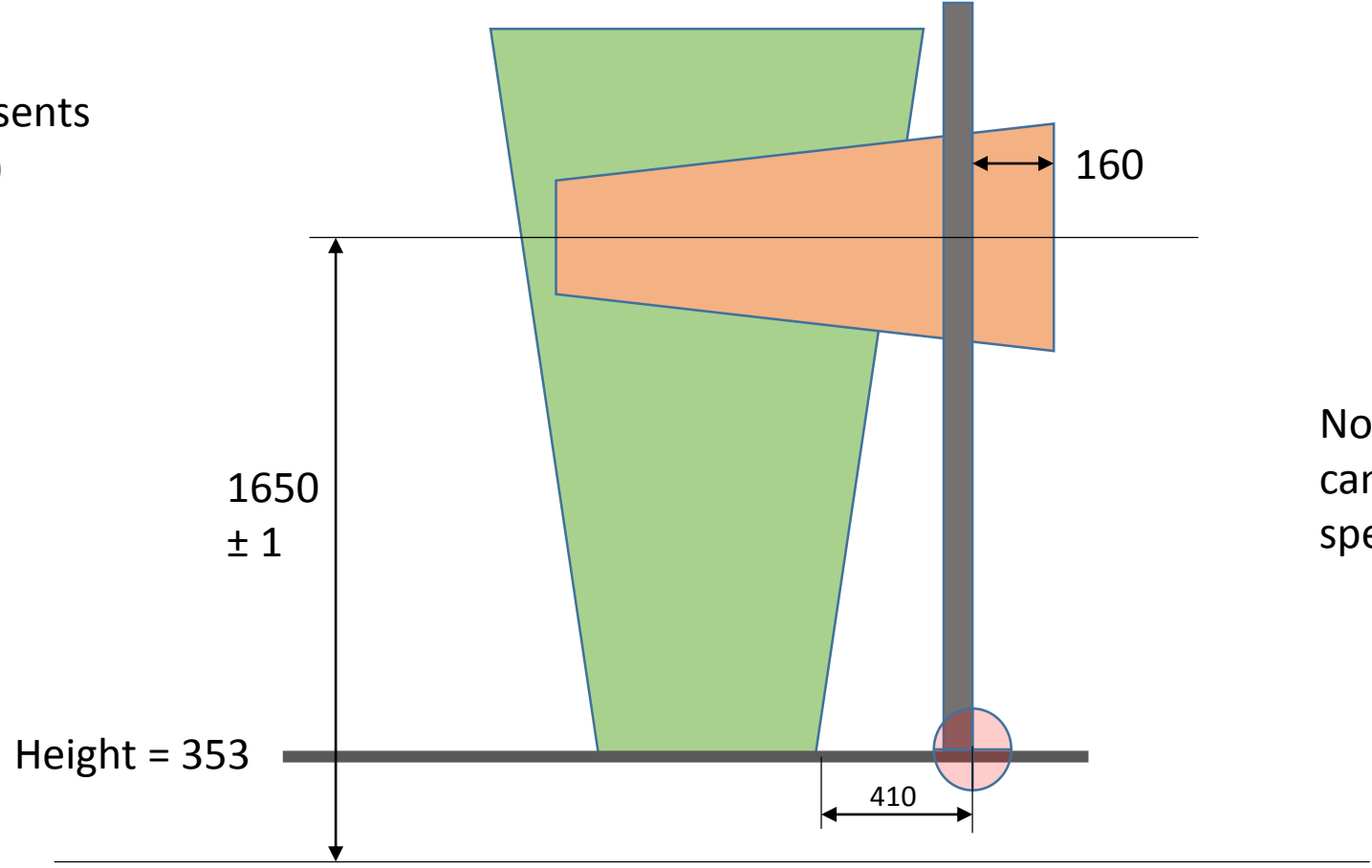
Nota. The horizontal chambers
can roll in "x" so must be
specified for each new position.

Height = 353

410

Z values of T0/3 16 Sept to 22Oct 2015
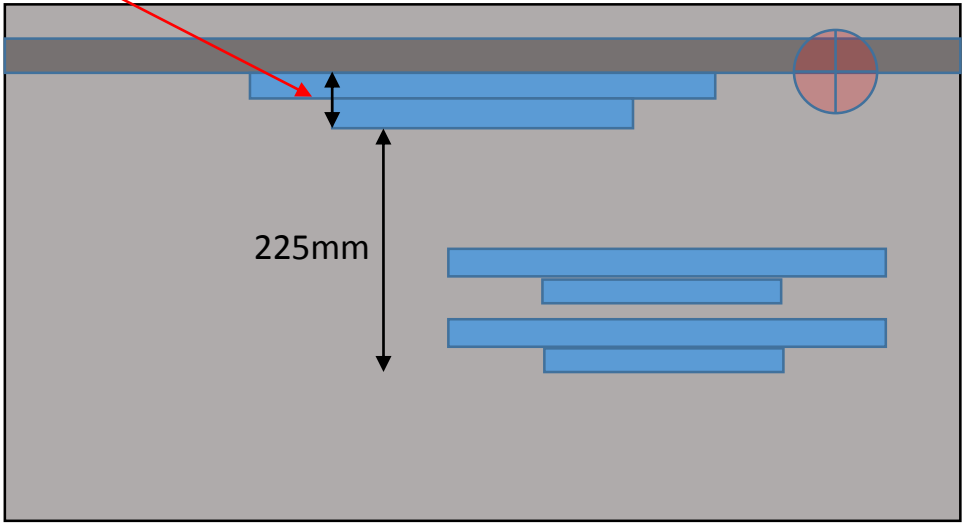
Positions Trolley 30Aug to 16 Sept 2015

T1

- Ref point to Jura wall 2770mm

- Ref point to upstream wall 2509mm

- Ref point to Saleve wall 2856mm.

T0

- Korea chambers from Jura wall 3104mm

- Front Korea chambers to source 3229mm

- Korea chambers occupy a Z space of 194mm

Positions Trolley 16 Sept to 22 Oct 2015

T1

- Ref point to Jura wall 1507mm
- Ref point to upstream wall 1529mm
- Saleve wall to trolley edge 1292mm.

T0

- RE vertical chamber from source 4447mm
- RE vertical chamber from Down Stream wall is 10266mm
- Korea, front, chamber from source 4185mm
- Korea chambers to Saleve wall 2846mm
- Korea chambers to Jura wall 1731mm
- Ref point to Jura wall is 1878mm
- Ref point to Saleve wall is 3730mm

- Glass RPCs frame from source 1892mm

Glass RPC

24 Sept 2015

- Glass RPC closest to source centre (not the frame) is 2129mm in Z.
- X and Y are not known/measured.

13 Oct 2015

- Ref point on frame to Jura wall 3047mm
- Ref point on frame to Saleve wall 2072mm
- Ref point on frame to source centre = 1489 + 452 = 1941mm

22 Oct 2015

- Ref point on Frame to Jura wall XXXXmm
- Ref point on frame to source centre = XXXX + 452 = XXXXmm

Positions Trolley 22 Oct 2015

T1
- Ref point to Jura wall 2282mm
- Ref point to upstream wall 1677mm

T0/3
- Ref point to Jura wall 3272mm
- Ref point to Source 3610mm
- Korea chambers from Jura wall 3345mm
- Scintillator CL to alcove 1574mm
- Scintillator CL to steel floor is 1289 + 353 = 1642mm

- MDT scintillator to alcove 1587mm
- MDT scintillator to steel floor 1575mm

Coordinate table to convert Bunker wall measurements to trolley coordinate system.

30 Aug to 16 Sept 2015

Source to down stream wall = Zs		
Source Upstream	6177	

Source to Jura wall	3278
Source to Saleve wall	1??
Source to Alcove wall	2350

T1 = 282 above floor	282
T0 above floor	353

		Zm	Zm	Zs	Zs	[+]Zf
				Down stream	Upstream	
		Down stream wall	Upstream wall			
30Aug to 16 Sept	T1		2509	NA		-3668
	T0					
	Korean chamber				3229	-3681
16 Sept to 8 Oct	T1		1529			4648
	T0					
	Vertical Chamber				4447	
	Korean Front					

Xm	Xm	(+)Xf
Jura wall	Saleve wall	
2??		508
	2856	506
3104		174
1507		1771
	1292	253

Ym	Ym	Yf
Floor	Trolley	
		-1358
		-1287
		-1358

Source 1/2 valu in Z	452
Source 1/2 valu in X	530
Source above floor	1640

Document is here; http://rpc-cms-re4-upscope.web.cern.ch/rpc-cms-re4-upscope/RPC/GIFPlusPlus/Installation/Coordinates/CoordinateGIF05Oct2015.xlsx

Position of chambers within Trolley.

T0

- Base of RE type 2 is 355mm above steel floor.
- Base of RE type 2 is 415mm from ref point.
- Centre of RE type 2 is 764mm from ref point.
- Front face of RE2 is 10266mm from down stream wall.
- Korean chambers above steel floor are 1650 ±1mm.
- Horizontal rails (L>1.6m) above steel floor are 1250mm.
- Dimension between uprights is 1390mm.

T1

- RE type 2's Centre Line are 1665mm above steel floor.

Available space to manoeuvre Trolleys in Bunker

- Hand rail to far end of alcove is 3620mm.
- End of alcove to down stream wall less shielding rail for TDC is 1400mm.
- Gas panels are 250mm from wall. And 100m for piping.

Source and hand/guard rails

Nominal Beam line.

730

905

Distance to Saleve wall = 1545

1060

1940

Distance to Jura wall = 2308

1665

Subdetectors occupation in "Z"
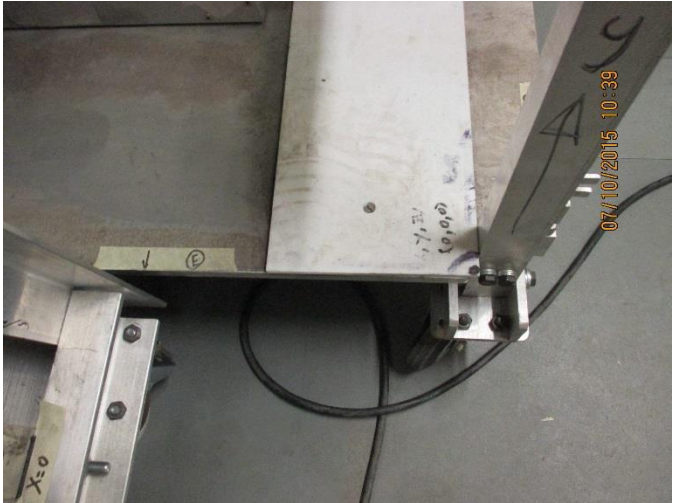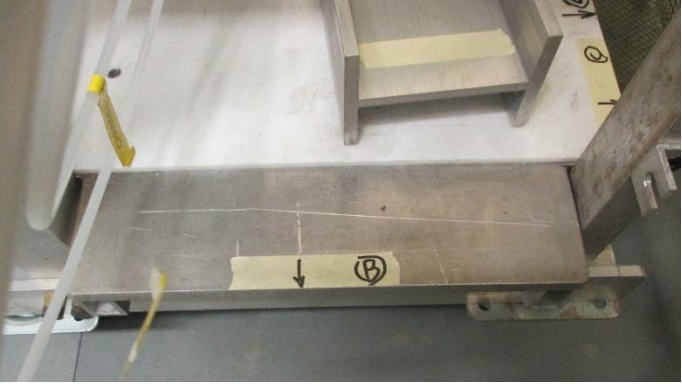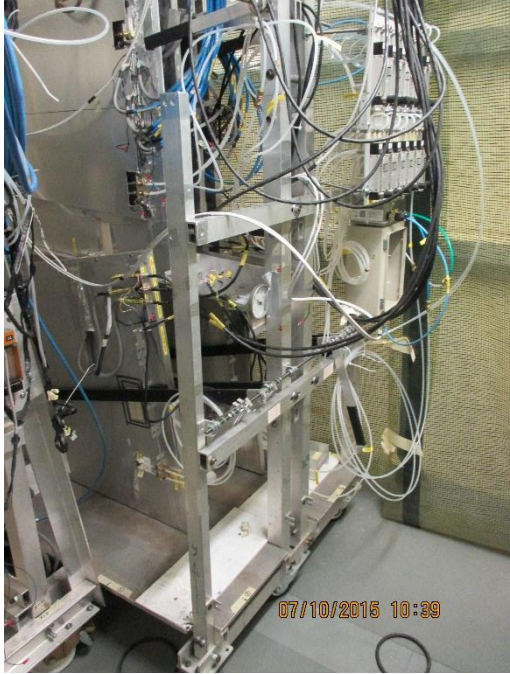
- T1   1100mm
- T0   800mm
- Glass   800mm
- MDT   1400mm
- Micromegas   500 or 600mm.

Conclusion

- The base diagram by Fabiola should be done to scale in mm.

- The reference points for the trolleys works well except for the Korea chambers, and others that translate in x, where their distance from the walls will be given.

- There is a mixture of the above two systems as this is the first attempt.

- The spread sheet has to be improved in clarity.

- Position of chamber structure can be defined in all 3 coordinates using the spread sheet.

- The diagram defining available space in the bunker is not yet done.

- The method to calculate the strip/eta division is not done.

- The other detectors in the bunker are not noted.

- The available space with respect to infrastructure is not done.

- This document is here; http://rpc-cms-re4-upscope.web.cern.ch/rpc-cms-re4-upscope/RPC/GIFPlusPlus/Installation/Coordinates/CoordinateSystemGIF24Sept2015.pptx.

Additional material

Trolley T1 Measurements and ref points

Trolley T1 Measurements and ref points

- Saleve side