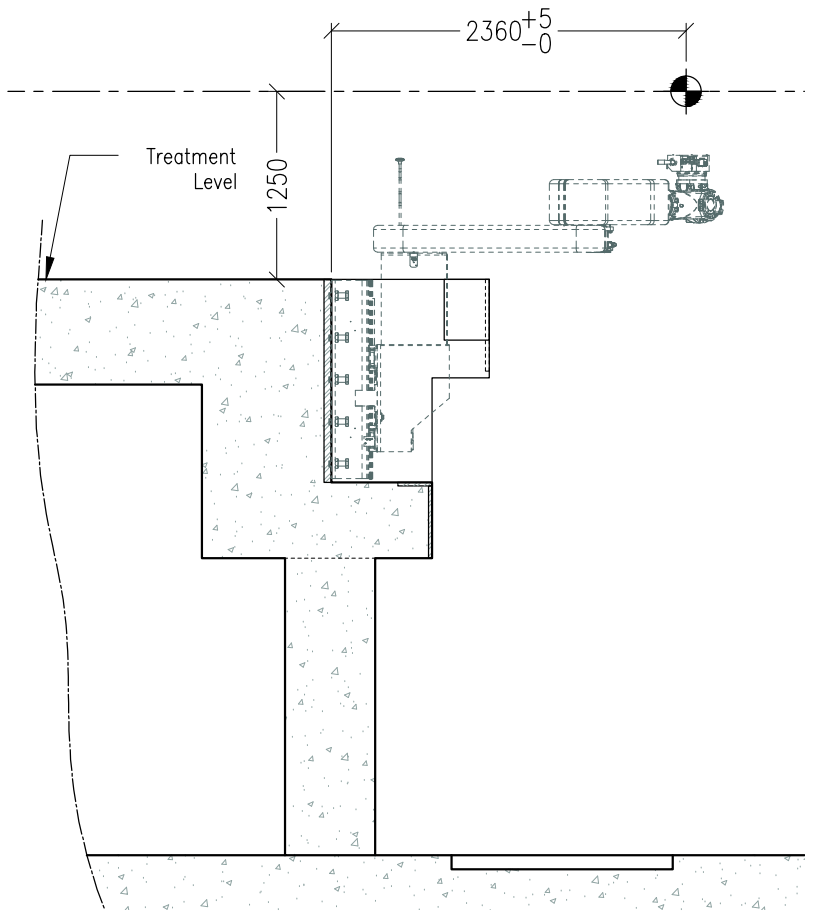
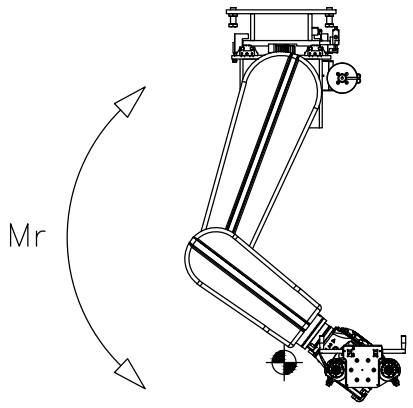




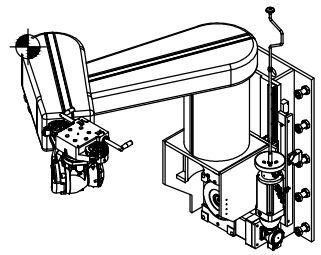
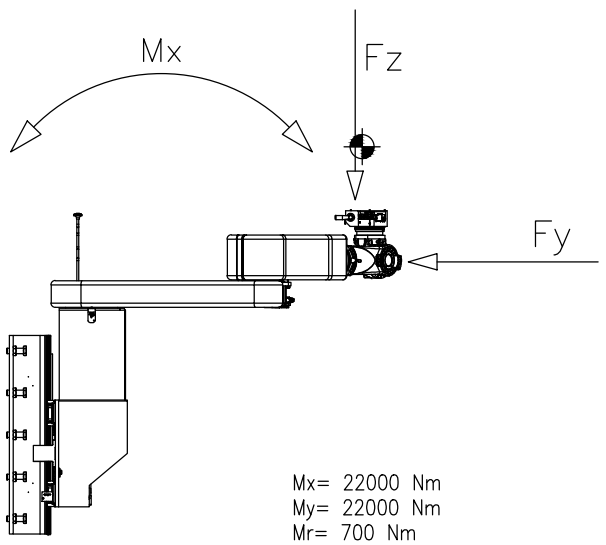
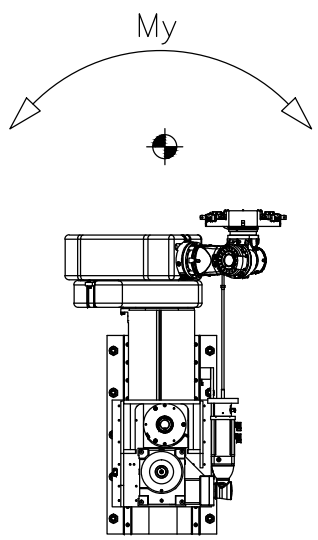


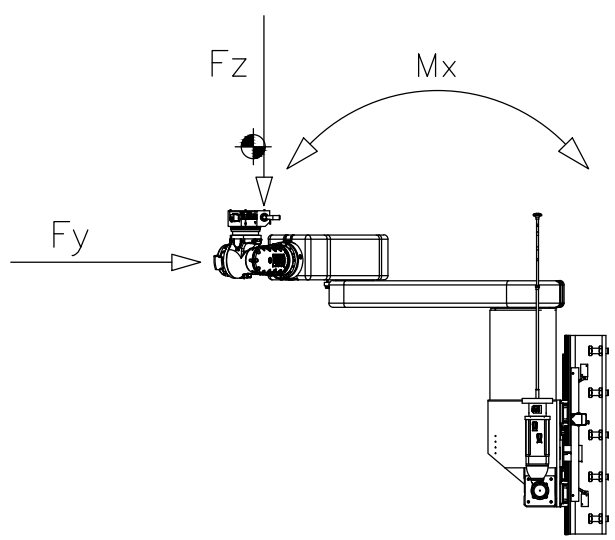
TABLE 1: Summary of PPS motions

Parameter Description	Requirement
Couch Treatment Volume	100 cm x 50 cm x 40 cm (±40"x20"x15")
Lateral Axis Stroke	Cylinder of 240 cm (7'-10 ½") around robot first rotation axis
Longitudinal Axis Stroke	Cylinder of 240 cm (7'-10 ½") around robot first rotation axis
Vertical Axis Stroke	60 cm (1'-11 ½") (lowest position = 80cm (2'-7 ½"))
Rotary Axis Travel	± 95° for treatment / ± 180° for patient handling
Pitch angle rotation travel	± 15°
Roll angle rotation travel	± 15°
Pitch angle correction	± 5°
Roll angle correction	± 5°
Motion Reproducibility	0.2 mm (±1/128")
Absolute Accurary for large movements	0.5 mm (±1/64") 1SD (translations) 0.2° (rotations)
Translation Speed (along vertical axis)	1.5 cm/s or 3 cm/s (±5/8"/s or 1 ¼"/s)
Translation Speed (along horizontal axis)	High speed 5cm/s and low speed 2.5 cm/s (±2"/s and ±1"/s)
Rotation Speed (around vertical axis)	3° or 6°/s
Rotation Speed (pitch and roll)	1° or 2°/s
Translation Acceleration	0.1cm/s² to 10cm/s²
Rotation Accelaration (around vertical axis)	Configuration between 0.1°/s² to 12°/s² (step 0.1°/s²)
Table-top length	220 cm (7'-2 1/2") standard long couch
Maximum patient weight (normal operation with immobilization devices)	180 kg (400 pounds)

1. The patient positioning system is required to position the patient so that the gantry nozzle direct the beam at the treatment volume from any prescribed angle.
2. Indicative values for weight and dimensions and moments of the Patient Positioner are indicated in the TABLE 1 (Summary of PPS motions) and on the attached figures.
3. The end of the couch has a long and a short extension. The short extension is sometimes necessary to let the nozzle pass close to the end of the couch. The long extension is sometimes necessary to support the patient such that the patient's treatment area falls within the treatment area of the couch. The reason for mentioning this is that the extension changes the area swept by the couch.
4. The PPS is installed in a dedicated pit as indicated in Figure 02.53 (PPS Pit embeds).
5. The structure will be designed with large safety margin to meet UBC Category 4 seismic requirements under a 180kg (400-lbs) load with vertical and longitudinal axis over the maximum travel range. The rotary axis will be positioned in order to have the couch in the extension of the longitudinal axis.
6. The D/BT shall provide embedded steel anchor plate with J-bolts in the concrete appropriate to attach the PPS. The dimensions and positions of these plates are shown in Figure 02.53 (PPS Pit embeds).
7. D/BT shall provide a horizontal closing of the PPS pit with an access panel and a ladder to get to the bottom of the pit.







PATIENT POSITIONER SYSTEM

S.A. ION BEAM APPLICATIONS

REV:	A	
DATE:	30/04/15	
MODIFICATION:	Original issue	
DRAFTMAN:	LCHEN	
CHECKED BY:	QBA	
VALIDATED BY:	PV	

MATERIAL: –
SCALE: 1/50 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

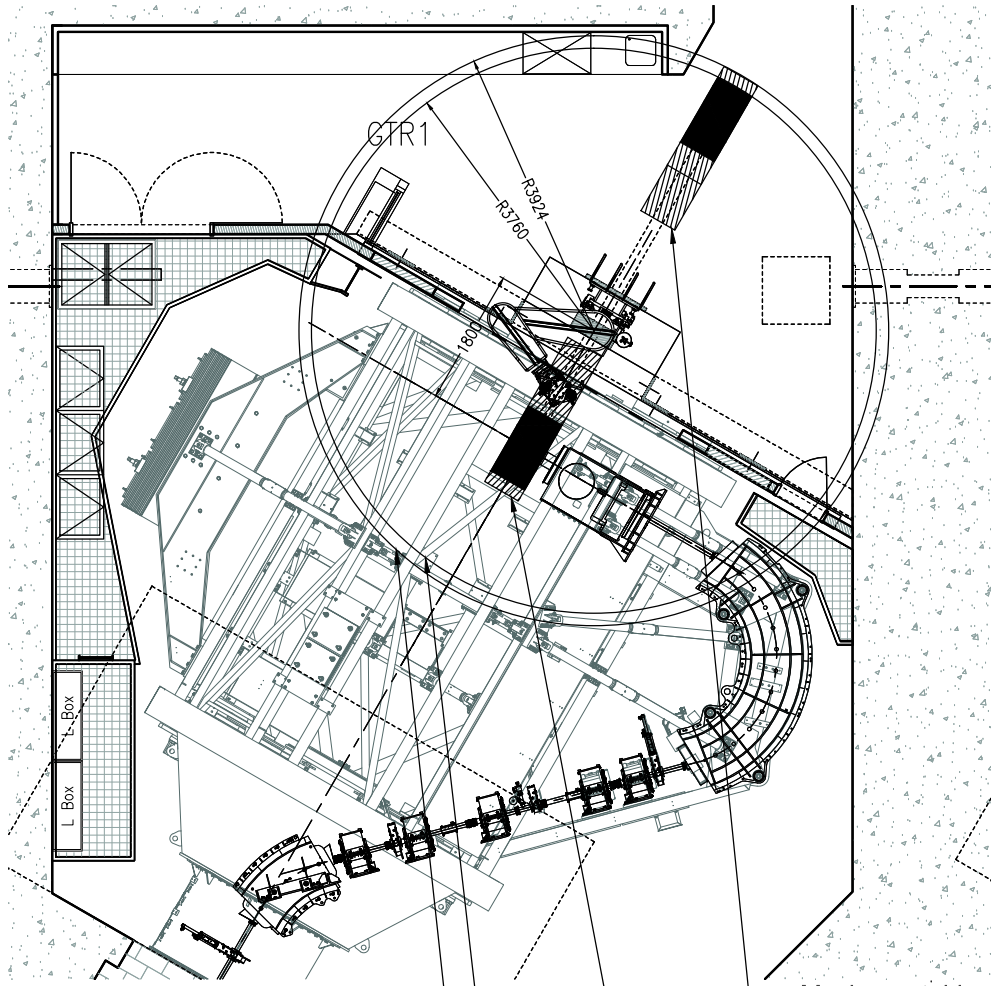
II.
ROOMS

Gantry Treatment Room

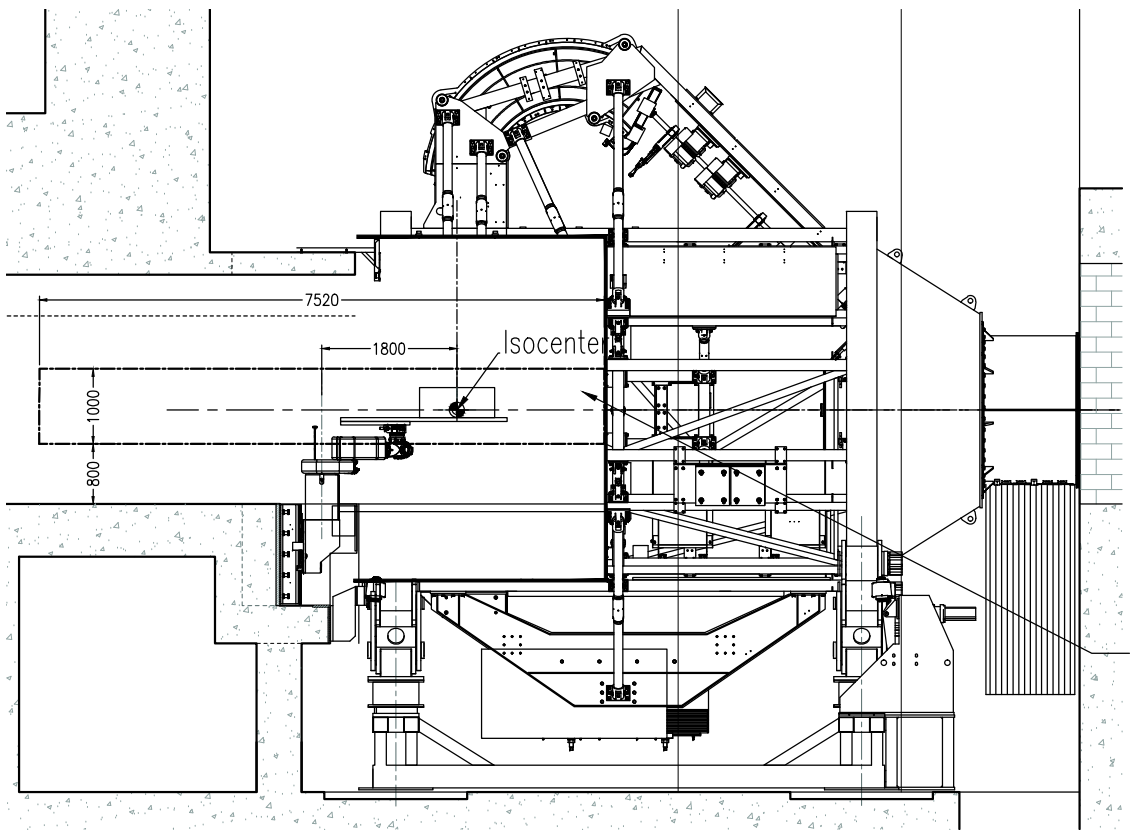
TITLE:
PPS Loads

07.42.33.

02.14 A

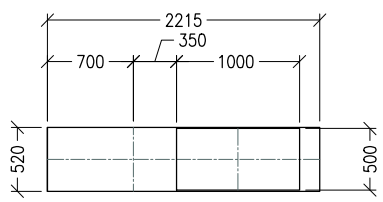


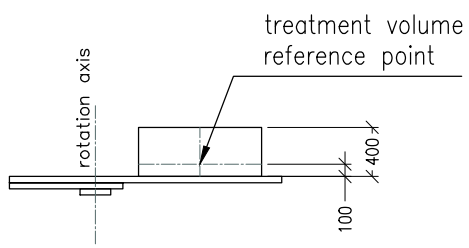
1. This figure show details of the PPS clearances, maximum space envelope and treatment volume.



SECTION

TYPICAL COUCH DETAIL





S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY

SPROJECT: TATA HBTF MUMBAI

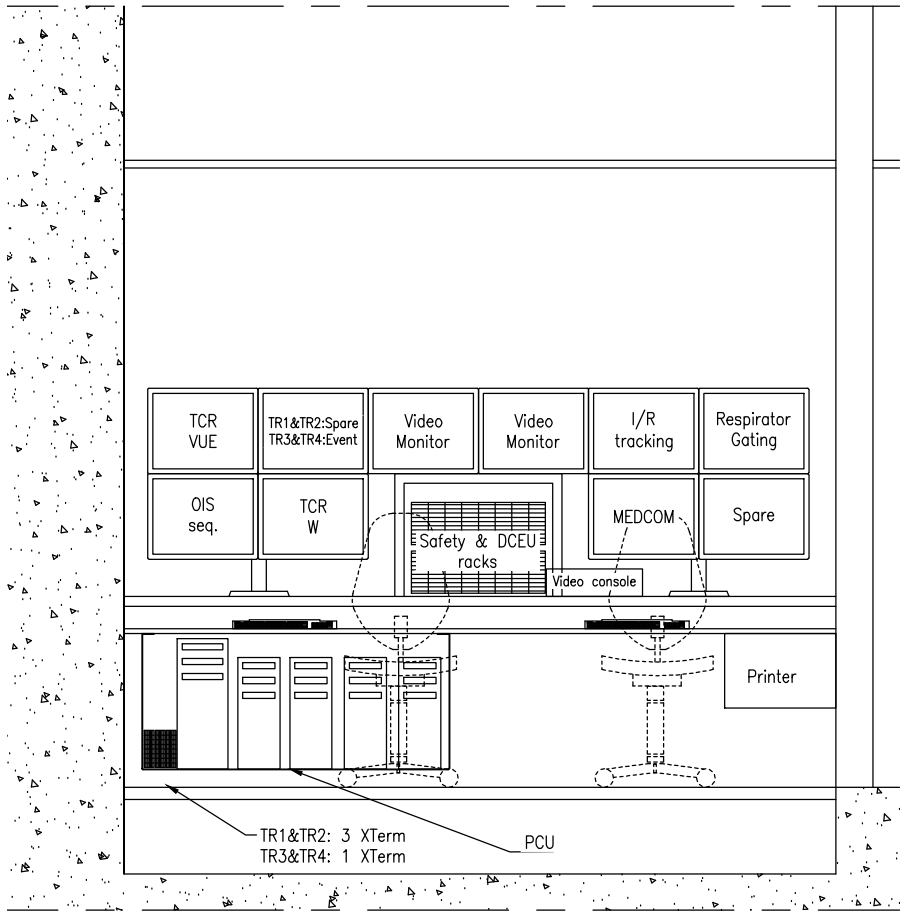
II.
ROOMS

Gantry Treatment Room

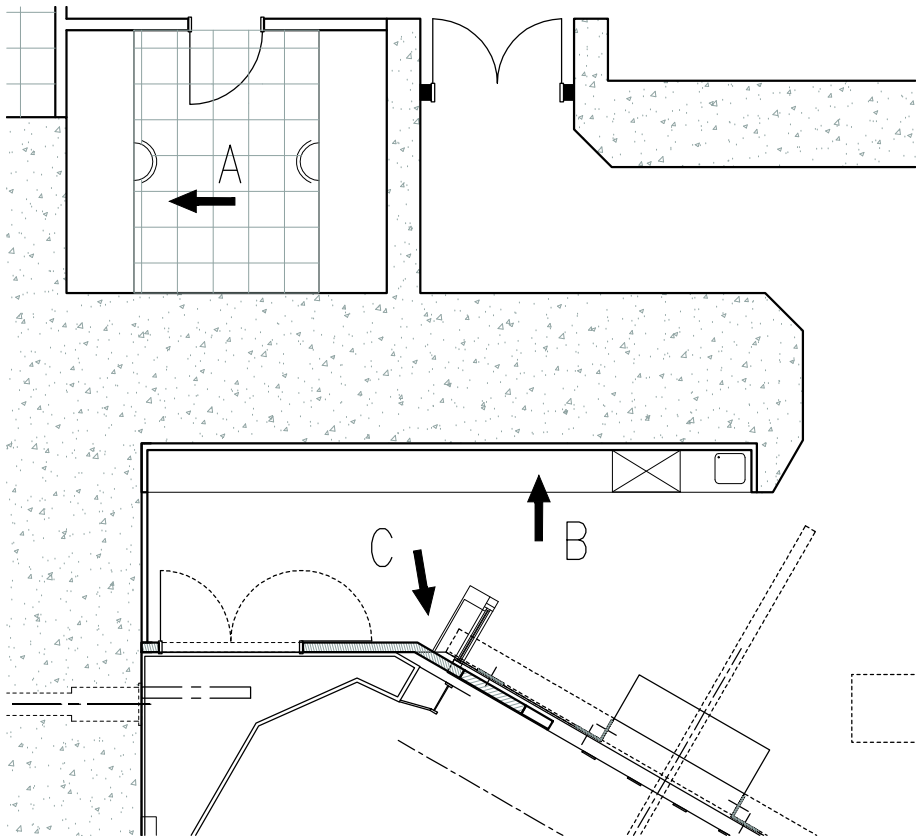
TITLE:
Robot clearances

07.42.33.

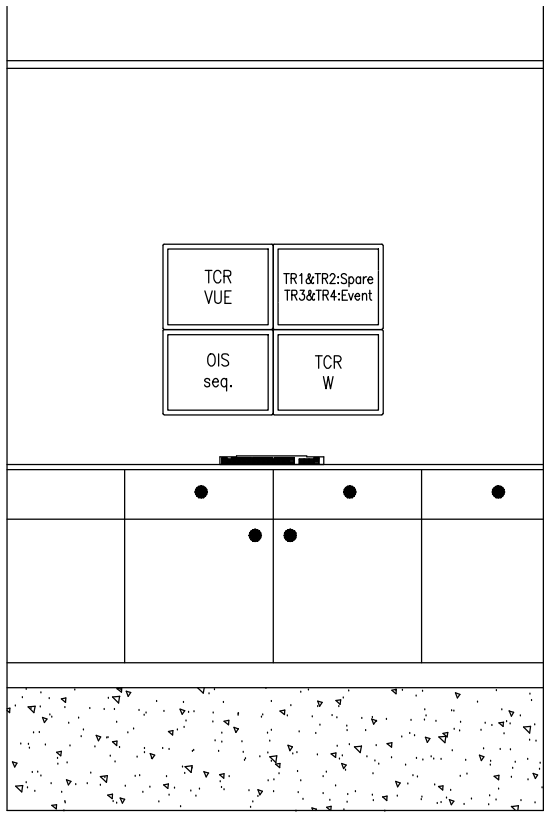
02.15 A



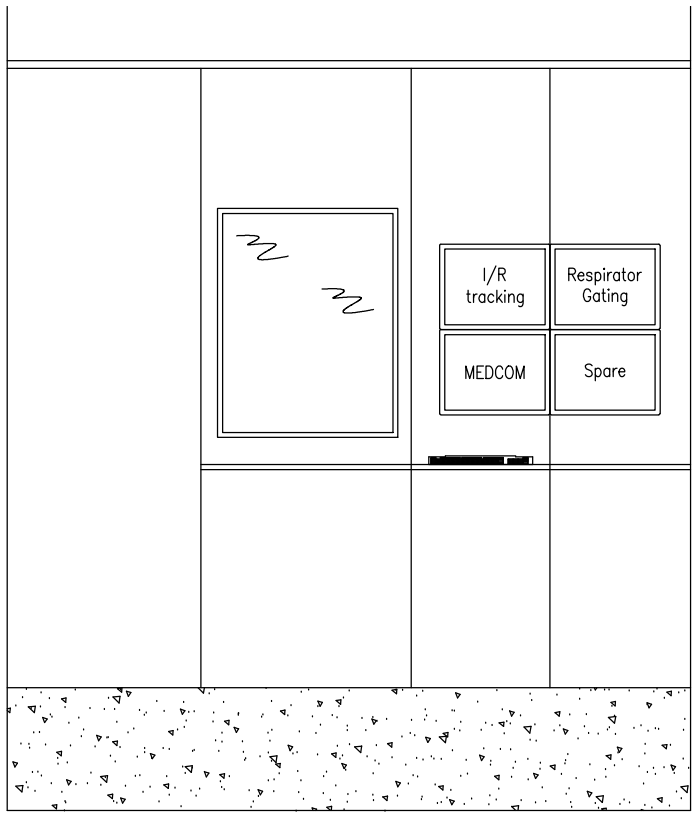
VIEW A



1. This figure show details of the IT equipment in TCR, TR wall and Xray booth. This shows a typical configuration and may vary to comply with customer's options.



VIEW B



VIEW C

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY

SPROJECT: TATA HBTF MUMBAI

II.
ROOMS

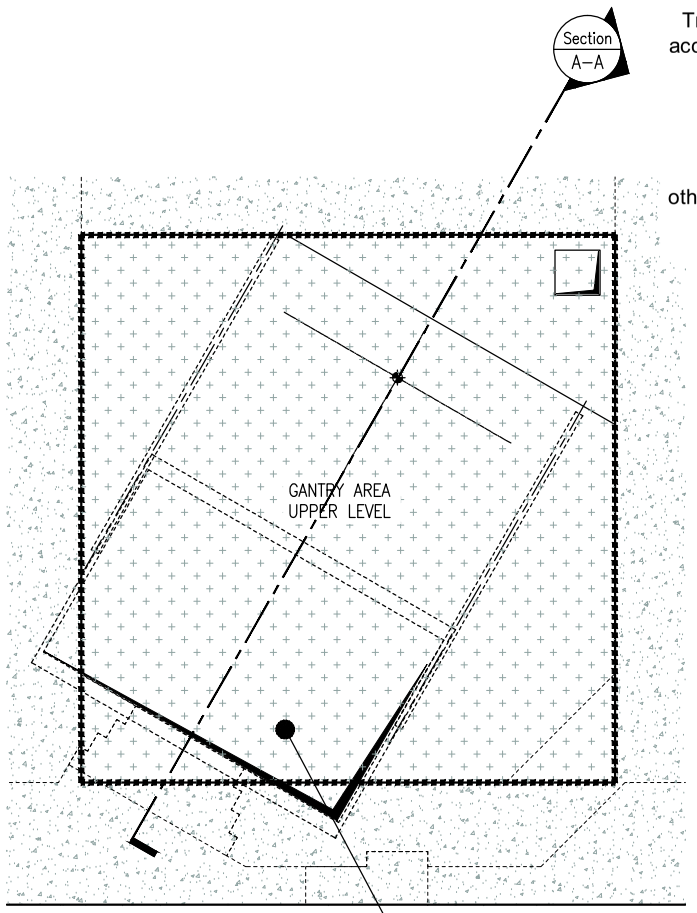
Gantry Treatment Room

TITLE:
TR & TCR desk equipment proposal

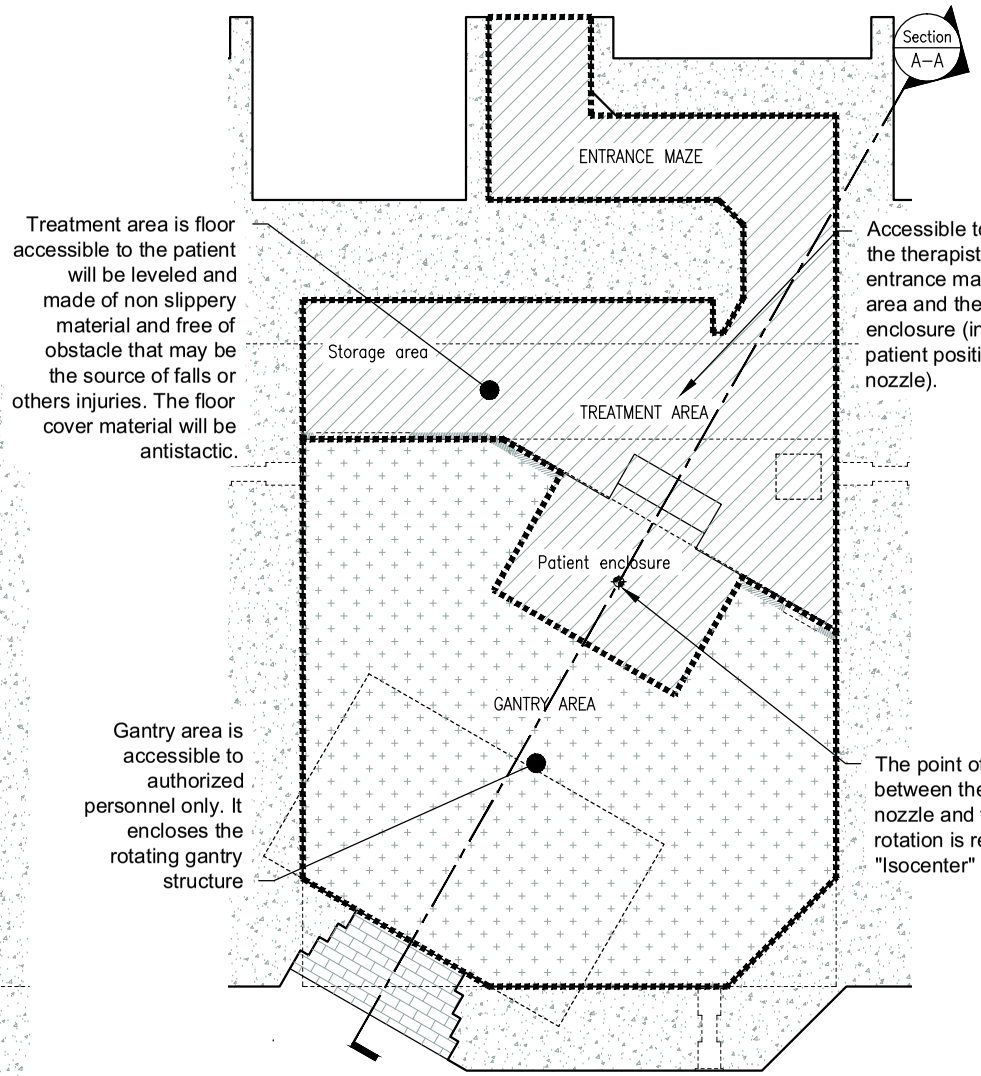
07.42.33.

N

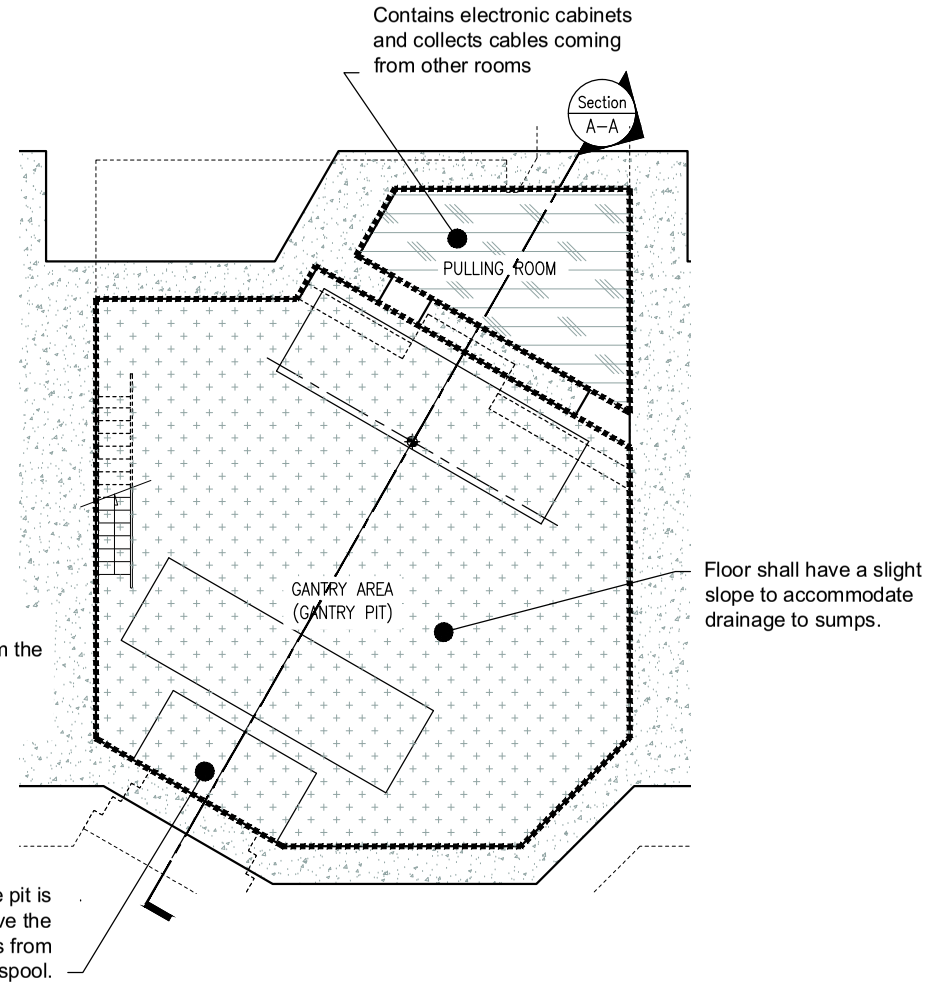
02.16 A



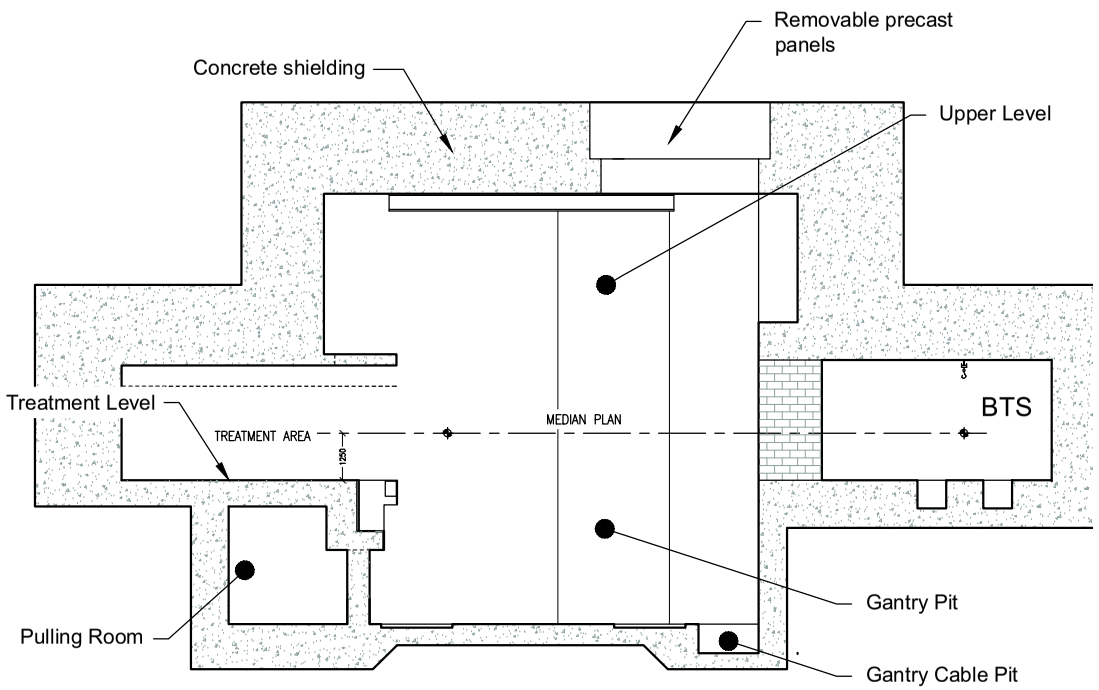
UPPER LEVEL



TREATMENT LEVEL



BASEMENT



SECTION AA

1. The entire room is provided with a shielding that protects the personnel outside the room when the treatment is in progress; this shielding consist of thick concrete walls. The shield wall between the gantry area and the BTS is required to protect personnel who may be in the treatment room while the BTS is transporting beam to another room. The adequacy of the shielding material specification and thickness is the sole responsibility of the customer and the D/BT

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/150 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
SPROJECT: TATA HBTF MUMBAI

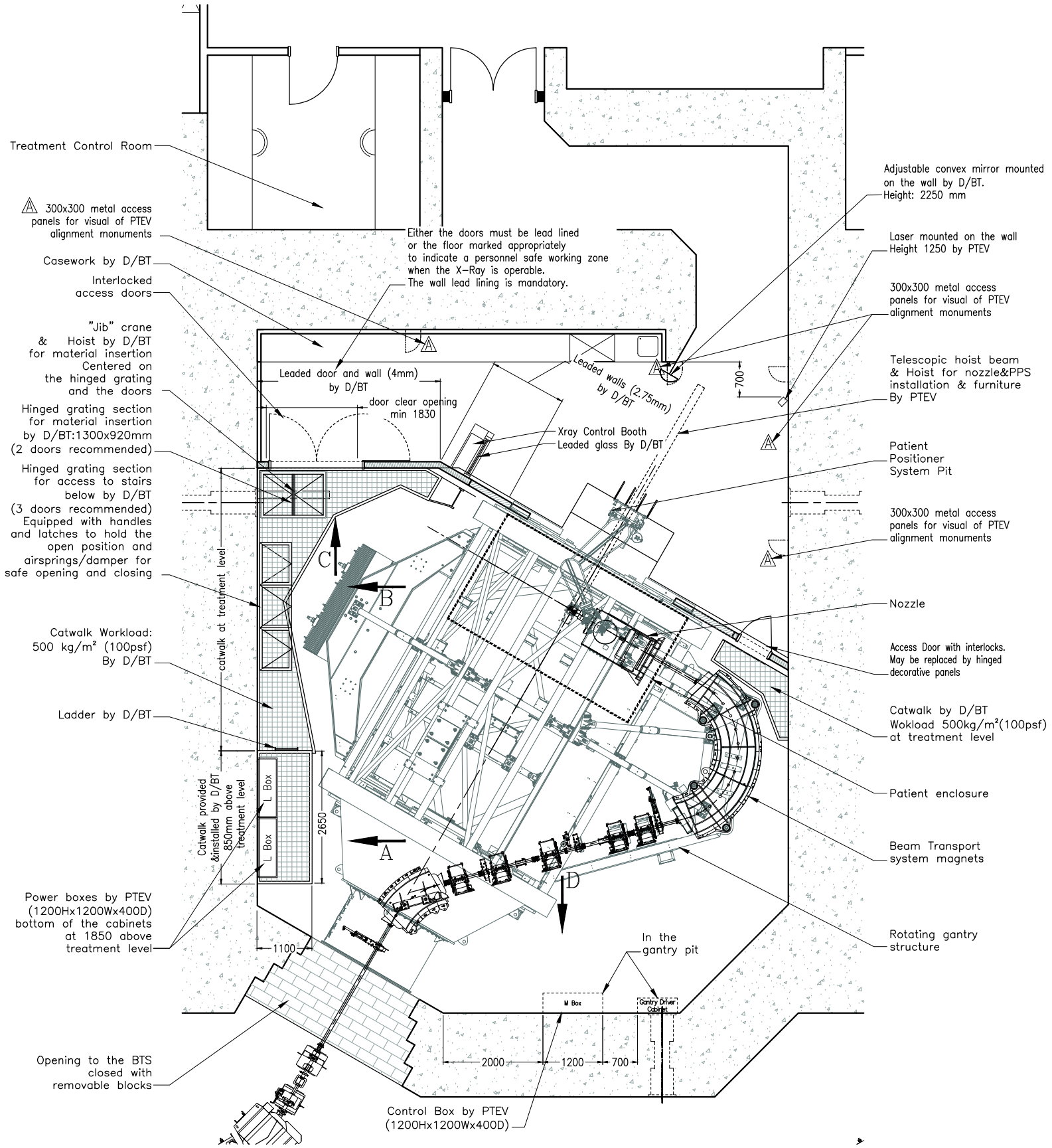
II.
ROOMS

Gantry Treatment Room

TITLE:
Gantry Treatment Room
Main Areas

07.42.33.

02.31 A



TREATMENT LEVEL

TREATMENT AREA

1. The treatment area must be finished to present an appropriate clinical appearance.

2. An accessible and dismountable suspended ceiling will be foreseen and cover the complete treatment floor area. For the details of the equipment fixed on the ceiling see Fig. 02.52. In order to provide access during gantry installation and to prevent from construction damage, the installation of the suspended ceiling and the finishing of the walls must be done by D/BT after the installation of the equipment.

3. It will always be possible to open the doors of the treatment rooms from the inside. Door hardware shall meet the industrial standard for safety design and function. These doors will remain open unless specifically closed by the therapist's action. The logical must be the following:
   - When the doors are closed: one push for the opening of the doors. The doors remain open.
   - When the doors are opened : one push for the closing of the doors. The doors remain closed.

4. Within the treatment area an X-ray control area will be erected by D/BT after installation of main equipment by PTEV. The protective walls of this X-ray control area will be lead lined in order to protect the therapist during X-ray shots. A lead glass will be arranged to ensure visibility of the patient during X-ray shots. These protective walls including the lead glass will comply with the requirements of the IEC 60 1-1-3.

   The dimension of leaded glass and wall on drawing are only recommendation. The calculation of needed thickness is under D/BT responsibility.

5. A safe level of lighting will be maintained during patient's introduction and exit.

6. The building's design should be verified and validated in order to ensure there are no edges or corners that could possibly cause injuries to the patient. All rooms where patient are present will be equipped with fire detectors and water sprinklers in compliance with applicable regulations.

7. Emergency lighting, phosphorescent exit signs and phosphorescent bands on or close to the floor will be provided to facilitate evacuation per Building & safety codes.

8. In treatment room, the building equipment (HVAC, ...) shall not produce more than 65 db (daily average)

9. D/BT will provide 2x230 V (2x110V/120V US) connections on the ceiling for the vision cameras, 1 more if respiratory gating option is supplied.

10. PTEV recommends D/BT to supply and install a sufficient amount of medical gas outlets in the treatment rooms. This requirement shall be specified by the client/user

11. Between the gantry area and the treatment area are bifold doors, or equivalent, giving the possibility to open the entire wall between the treatment area storage room and the gantry area. They must be equipped with interlocks compliant with the requirements of the IEC 61508, to safeguard up to category 3. Same for motorized systems used for opening the doors if any.

GANTRY AREA

12. It will always be possible to open the doors of the Gantry Area from the inside. Door hardware shall meet the industrial standard for safety design and function.

13. Walk-on grating to be provided by D/BT to allow personnel entering the gantry area to approach the gantry as closely as possible while keeping the grating outside the space swept by the rotating mechanism. The gratings shall be designed to withstand the weight of personnel and tools.

14. A metallic staircase shall be installed for service personnel access between the treatment level area and the gantry lower level. The gantry staircase shall be installed prior to the gantry grating. It will be relocated and incorporated into the final gantry perimeter grating.

15. A site measurement shall be realized for the construction of each grating. This site measurement can be realized for each GTR only when the GTR main parts are installed and the alignment done. The D/BT shall coordinate these measurements with PTEV site management.

16. The walk-on grating must be cantilevered off the gantry room side-wall and supported by an independent support framing system that will allow for the removal of the grating and for the movement of equipment in and out of the pit area. The pit floor below the removable grating must be kept free of obstacle for the same reasons.

17. The concrete floor slab shall receive an industrial type floor coating and the walls and ceilings shall receive a high grade epoxy paint finish. The epoxy paint type shall be submitted to IBA for approval prior the purchasing.

18. Additional requirements related to the Gantry installation (hatch, beams, lifting points, etc.) are given in detail in Chapter III : Installation.

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

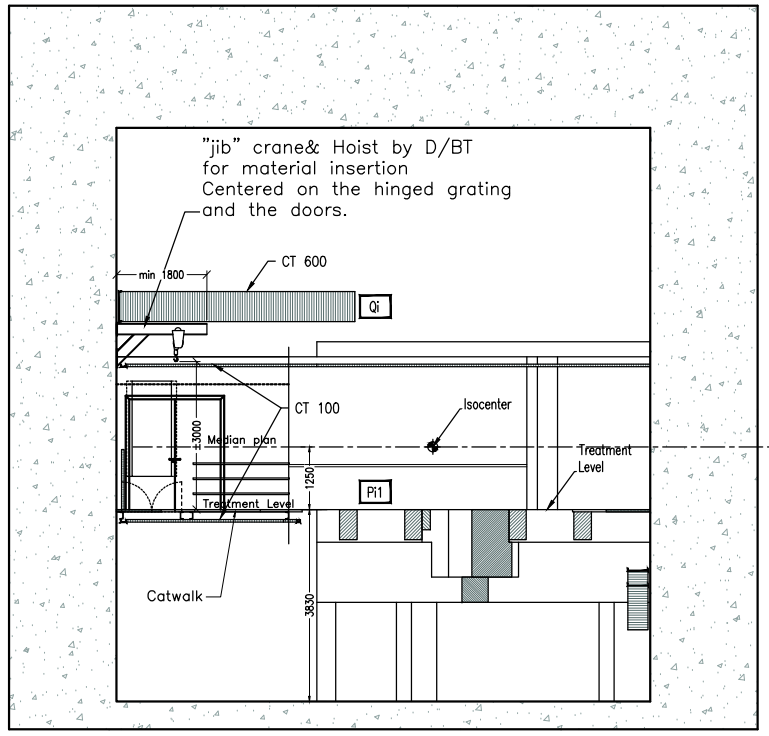
Gantry Treatment Room

TITLE:
Gantry Treatment Room

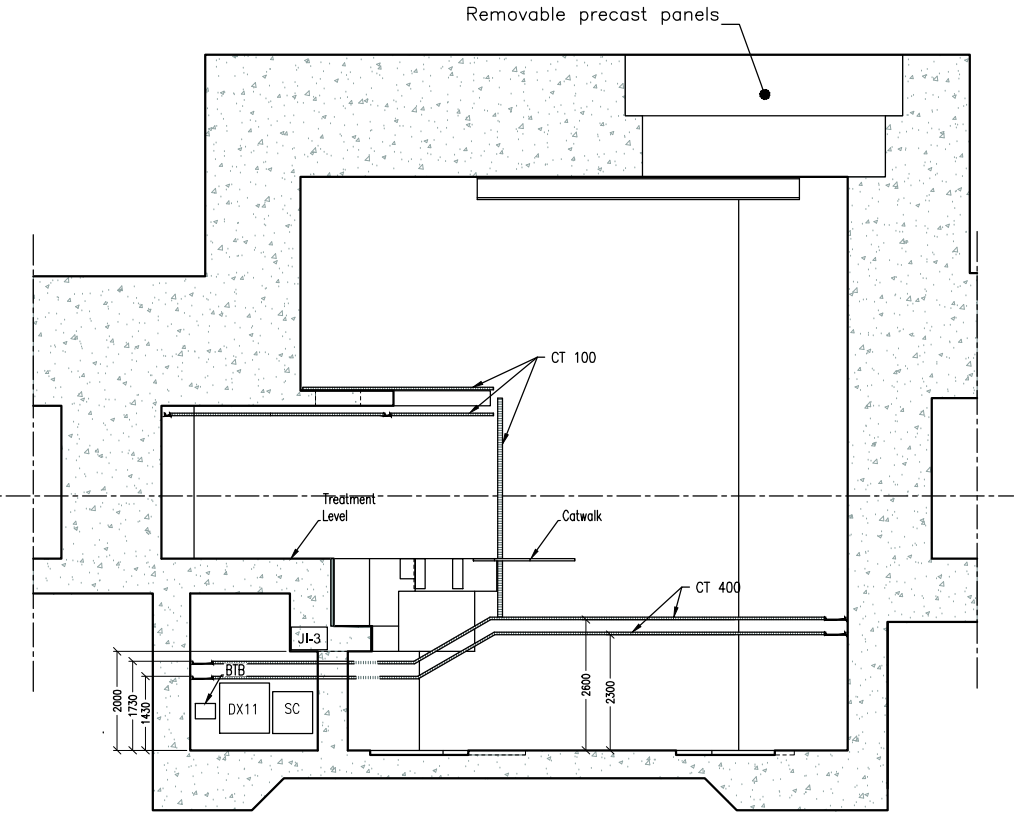
07.42.33.

02.32 A

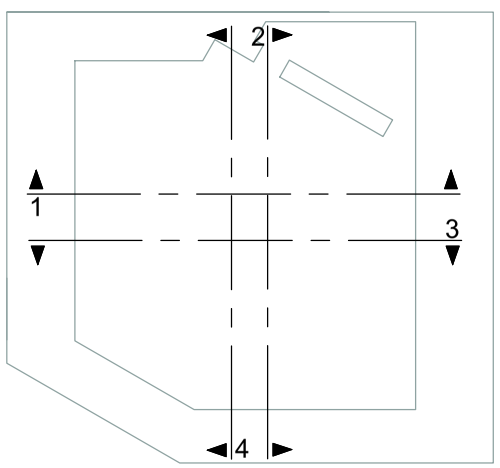
See also figure 02.33-2



View 1



View 2



1. These Figures show a draft of the walls views in the GTR with equipment installed such as Cable Trays, cabinets, catwalks, embeds, beams, furniture, plumbing... This is not exhaustive and need to be completed with data from other Chapters related to other technics. Nevertheless, this already gives a good idea of the space occupation on the walls.

2. D/BT shall design, provide and install a "Jib" crane in the Gantry area as shown in this figure centered over the removable grating, with hoist hook at 300 cm (10') above the grating. This crane shall have a capacity of 4.5 metric tons (5 US tons) to handle all components attached to the Gantry except the 135° dipole magnet. The D/BT shall provide a load test report for this equipment.

3. Since 10 metric ton (11 US tons) capacity is required to remove the 135° magnet, this would be exceptionally accomplished by opening the removable concrete beams in the upper Gantry level.

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/150 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

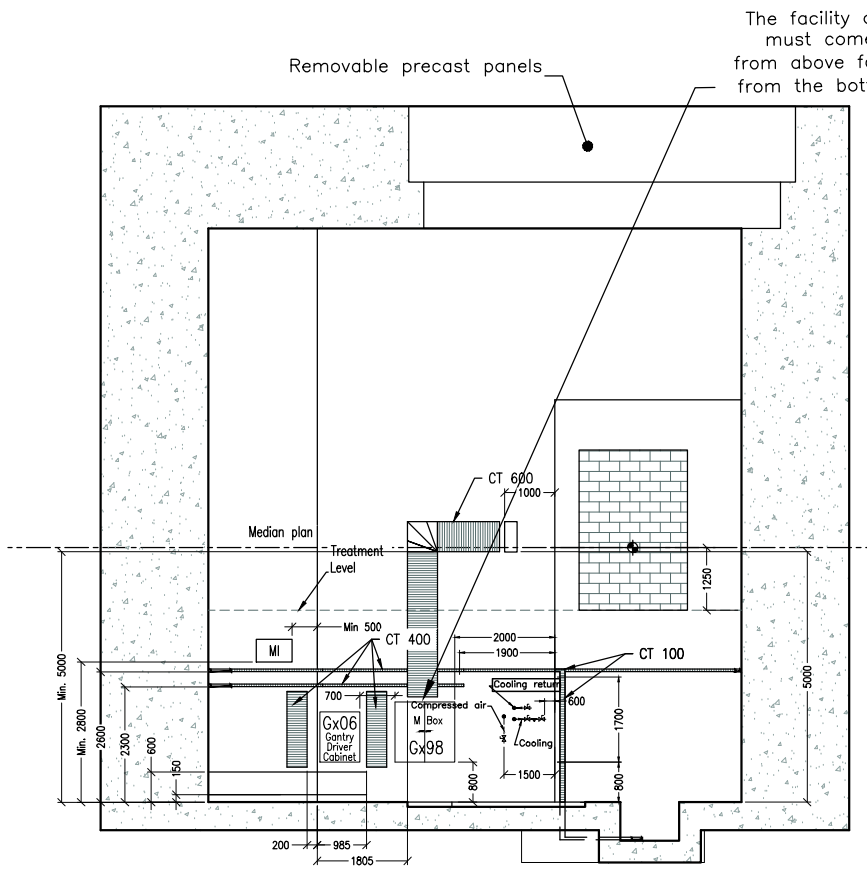
Gantry Treatment Room

TITLE:
Elevations

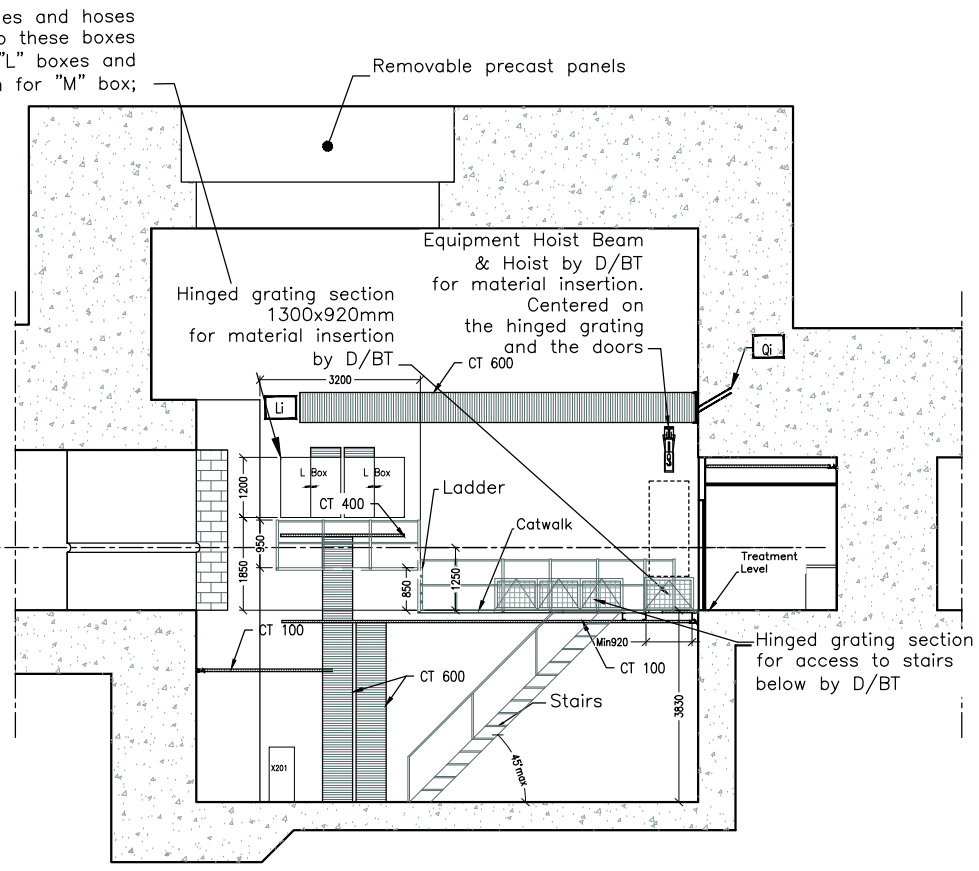
07.42.33.

02.33-1 A 1/2

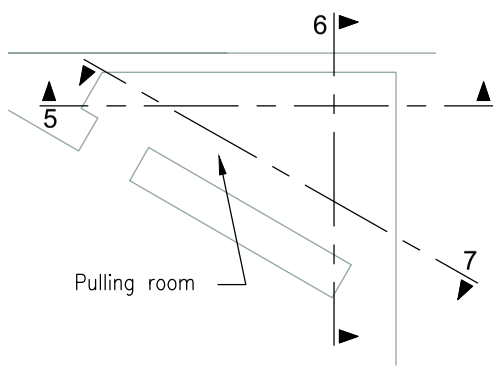
See also figure 02.33-1



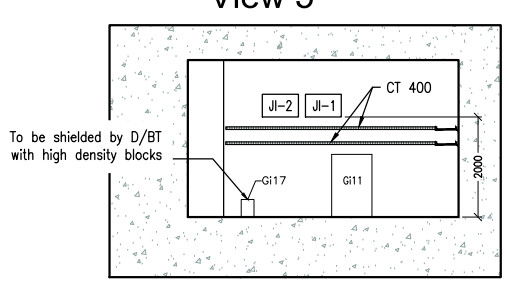
View 3



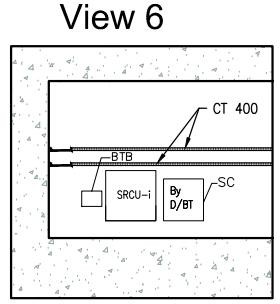
View 4



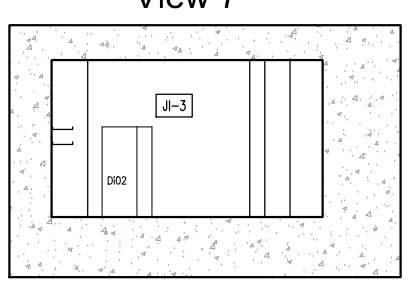
View 5



View 6



View 7



PULLING ROOM

1. D/BT will provide lighting fixture with safety lens cover and a light switch on each concrete wall inside the pulling room.
2. D/BT will provide 230V (110V US) wall outlet on the walls of the pulling room.
3. The concrete floor slab shall receive an epoxy type finish similar to the gantry pit. The walls shall receive a high grade epoxy paint finish similar to the gantry chamber.

S.A. ION BEAM APPLICATIONS

DRAFTMAN:	LCHEN
CHECKED BY:	QBA
VALIDATED BY:	PV
MODIFICATION:	Original issue
DATE:	30/04/15
REV:	A

MATERIAL: –
SCALE: 1/150 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

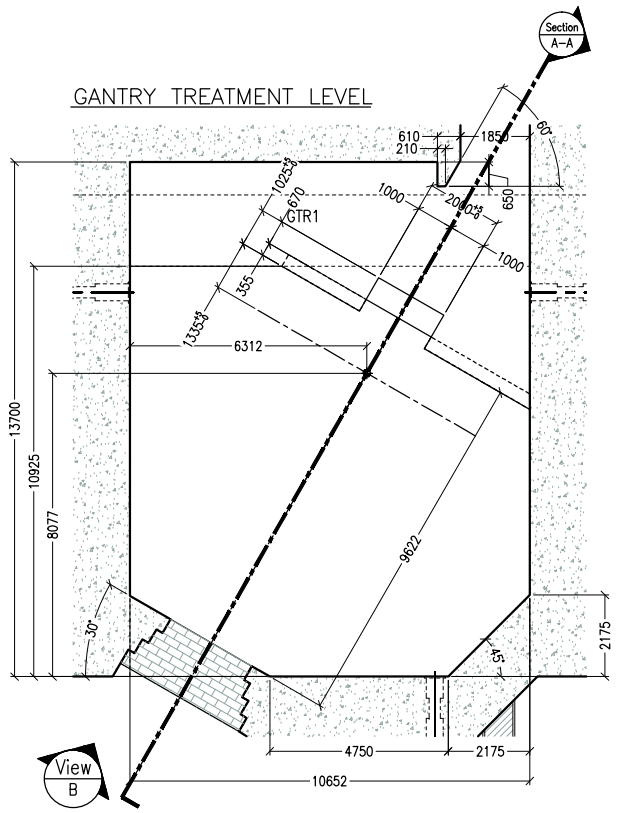
II.
ROOMS

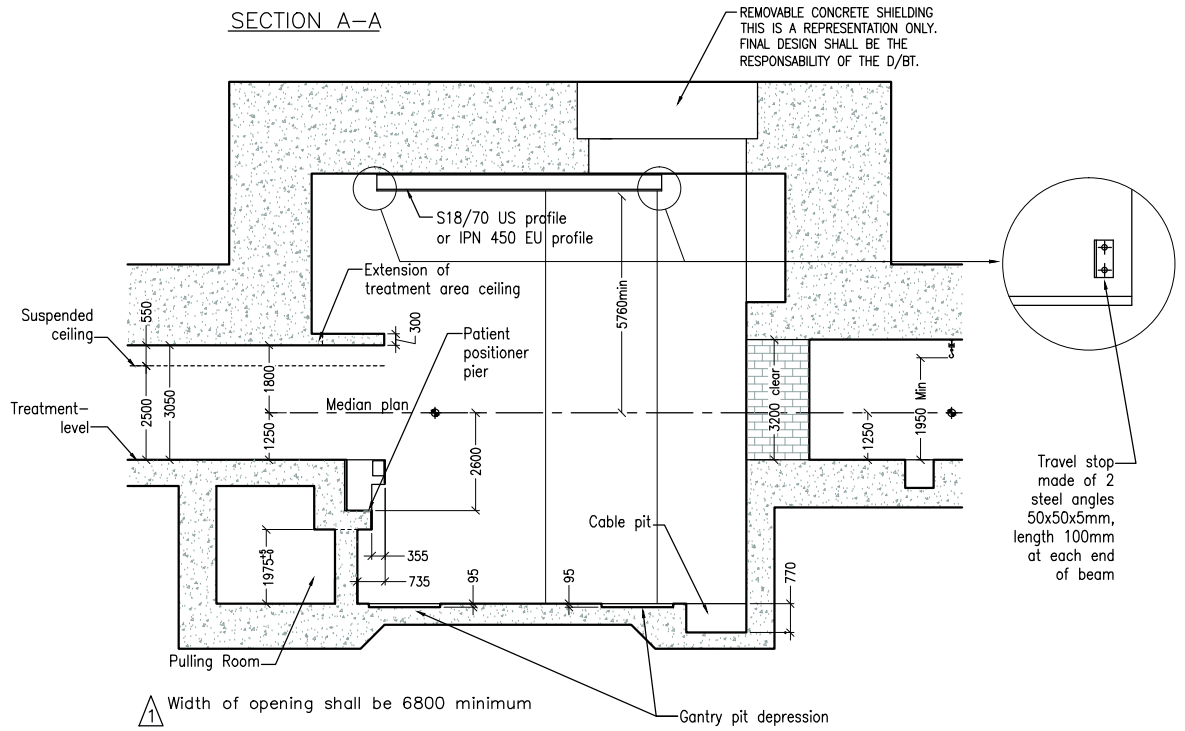
Gantry Treatment Room

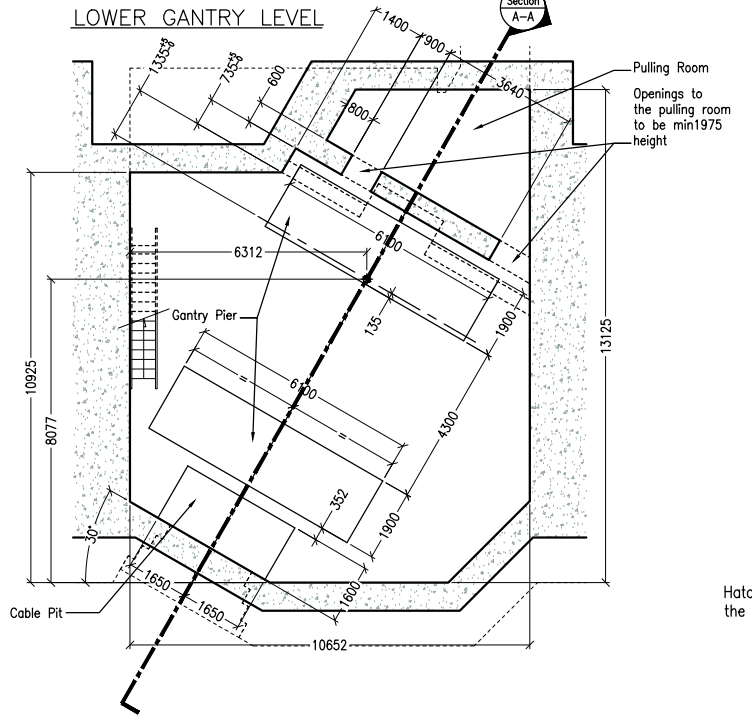
TITLE:
Elevations

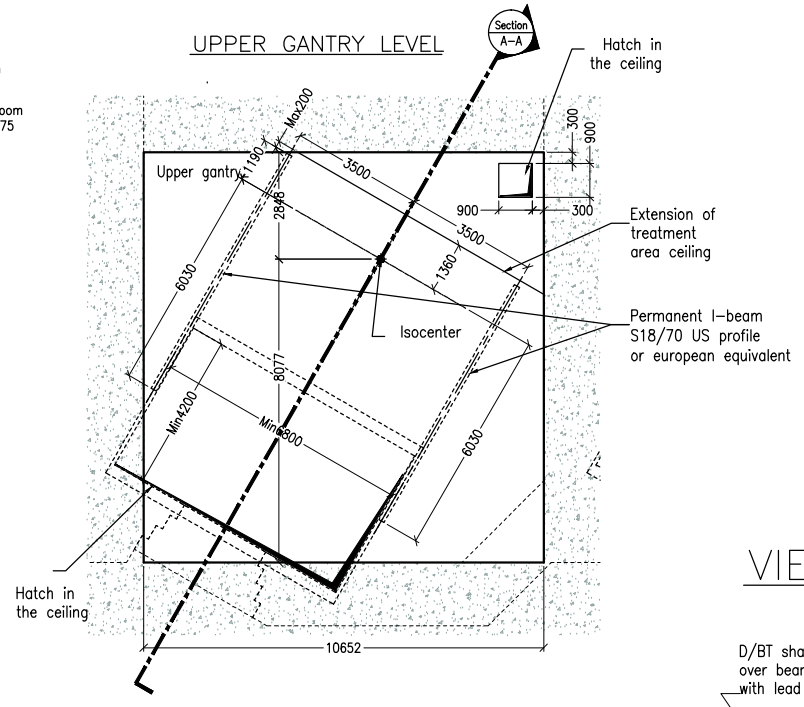
07.42.33.

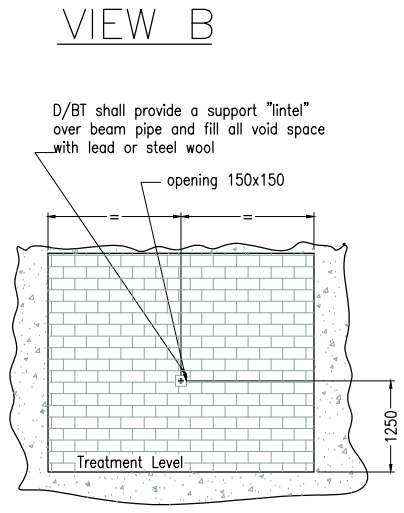
02.33-2 A 2/2











1. In Figure 02-51 (Gantry Treatment Room Dimensions) , different views and cross sections through the Gantry Treatment Room are presented with dimensions for concrete work and some additional details such as the Gantry Area lifting beams.

2. For Treatment Area, it is mandatory to have the Treatment Level 1250 mm(4'-1 $\frac{7}{32}$") under median plane level, within a tolerance of -0 +10 mm (-0 +½") (i.e.: 1260 to 1250mm under median plan). In this IBD, the Treatment Level consists of concrete finished floor and doesn't show specific covering details. According to project specific ground cover type or floor finish , D/BT shall adapt the floor levels to ensure that the finished floor level complies with this dimension.

3. For Gantry area, the floor shall be smooth and free of discontinuities greater than 2 mm/m (1/16") (hard steel trowel finish). The Gantry area floor shall also be flat to within ±10 mm (±½").

4. Gantry pit floor shall have a slight slope to accommodate drainage. Drain(s) holes shall be located at the bottom point(s) where the water could go. The floor drains within the gantry pit and the cable pit must be connected to a sump to avoid accidental flooding of the space.

5. The gantry pit is the lowest point in the building, so moisture and humidity detection is mandatory in that location. A control panel of all moisture and levels of humidity will be foreseen at least at one control point at each level in each GTR area. The detector system shall be submitted to PTEV

6. A section of the shielding wall between treatment room and the BTS area will be erected by D/BT with an opening. This opening will be closed at the end of PTEV equipment installation in respect of local radioprotection regulations

7. The D/BT shall submit beams design to PTEV approval.
   Anchoring of the beams to the ceiling shall be sufficient to support a concentrated point load of 22680 kg (50,000 lbs.) anywhere along the length (this load includes the equipment and rigging tools)

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/200 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

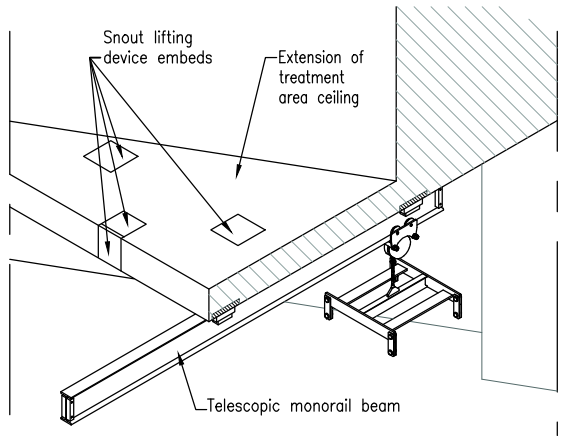
II.
ROOMS

Gantry Treatment Room

TITLE:
Gantry Treatment Room Dimensions Installation Beams & Lifting Points

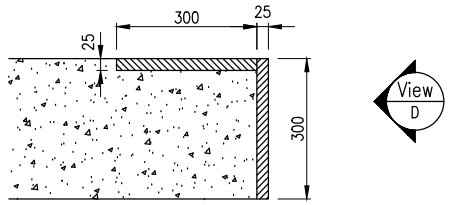
07.42.33.

02.51 A



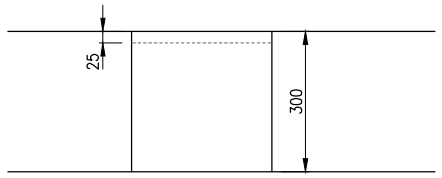
VIEW C

During Nozzle installation



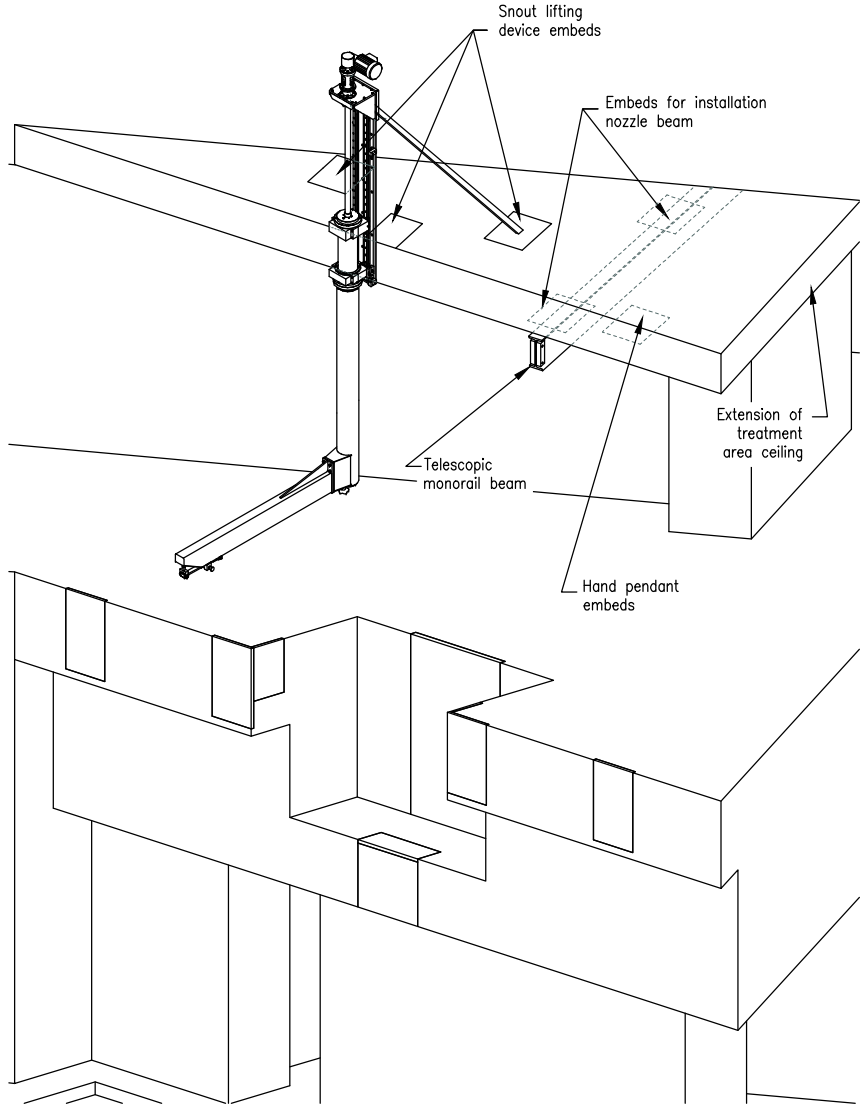
SNOUT LIFTING DEVICE EMBEDS

View C



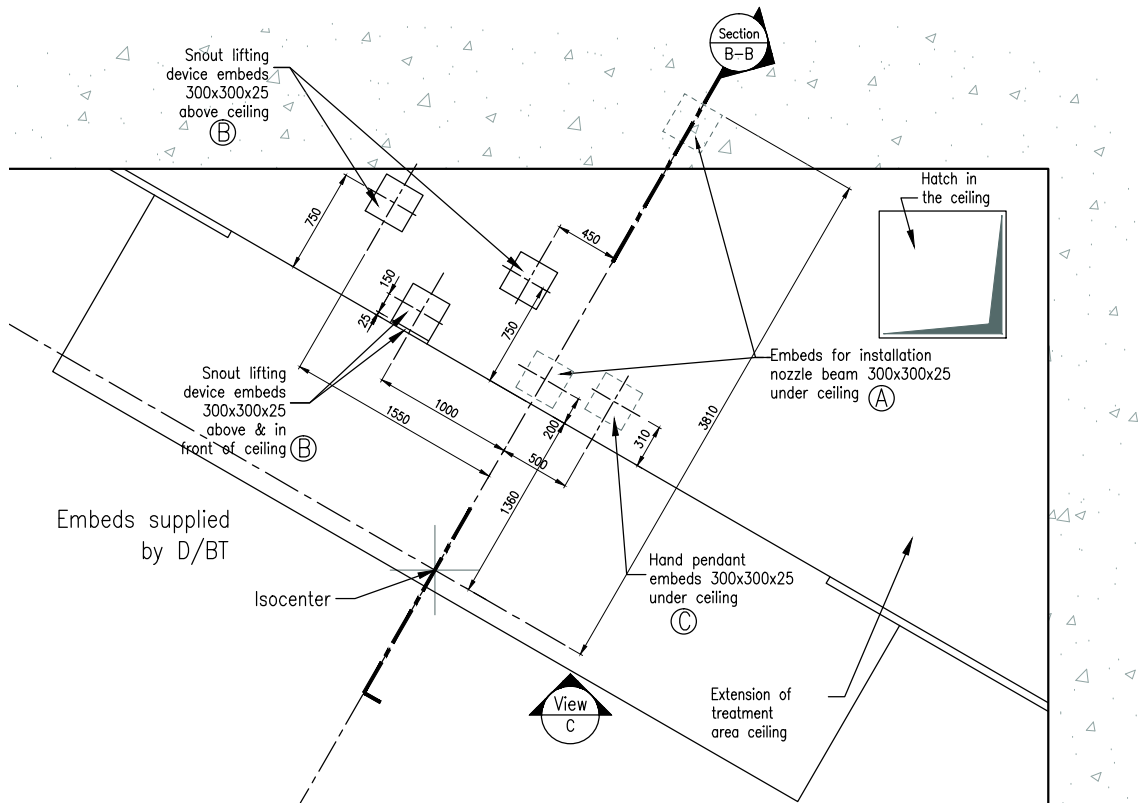
SNOUT LIFTING DEVICE EMBEDS

View D



VIEW C

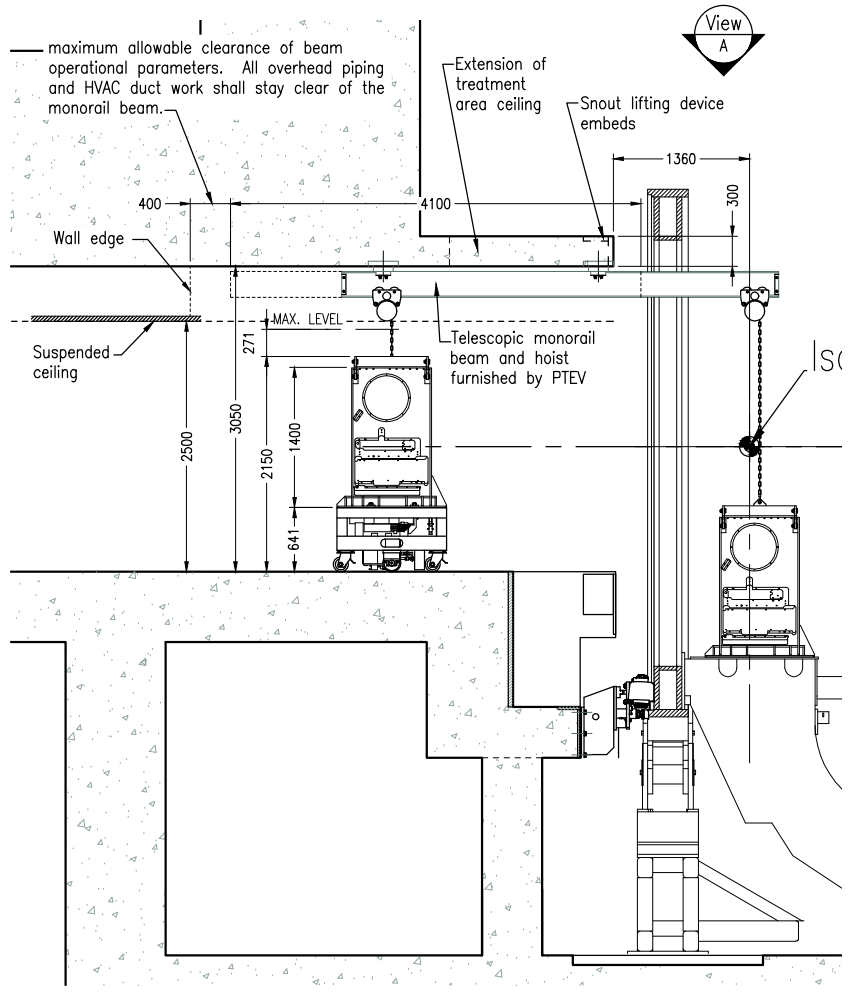
After Nozzle installation with snout lifting device



VIEW A-A

LIFTING DEVICES IN TREATMENT AREA

1. For installation and removal of the nozzle, a telescopic monorail will be supplied and installed by PTEV to the embedded anchor plates located at the underside of the concrete ceiling. This monorail is positioned in the same direction as the gantry rotation axis. At the end of the rail, a hoist delivered by PTEV is mounted to lift the nozzle. This hoist and monorail must have a lifting capacity of 2250 kg (5000 lbs). PTEV will deliver the nozzle handling apparatus and install it.
2. Embedded anchor plates shall be provided by D/BT in the concrete ceiling to attach the rail.
3. Since the suspended ceiling will cover the complete treatment area, D/BT can only install the suspended ceiling support frame after the monorail is installed and ceiling tiles after the nozzle and PPS are installed.
4. The lifting system will remain accessible for the nozzle maintenance after completion of the building by removal of the suspended ceiling tiles, the suspended ceiling system main support runners shall run parallel to the monorail beam.
5. To allow manipulation of the snouts during treatment or maintenance, a snout lifting device shall be provided and installed by PTEV on the ceiling on embedded plates provided by D/BT.



SECTION B-B

A ANCHORING 50 kN by anchoring in concrete CLASS "fck min. 25 N/mm² " temporary load
B ANCHORING 20 kN by anchoring in concrete CLASS "fck min. 25 N/mm² "
C ANCHORING 10 kN by anchoring in concrete CLASS "fck min. 25 N/mm² "

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: –
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

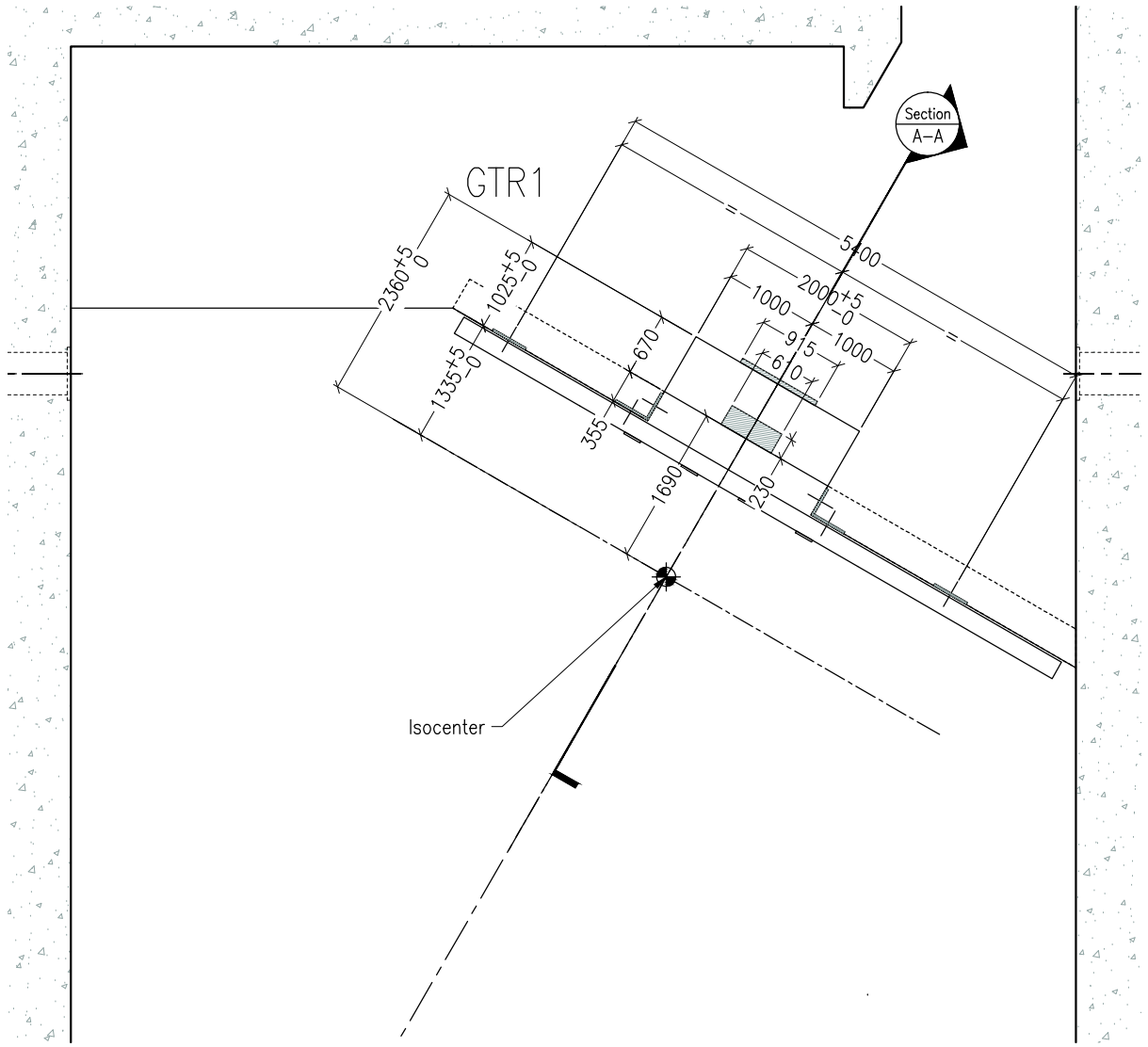
II.
ROOMS

Gantry Treatment Room

TITLE:
Gantry Nozzle Anchor for Lifting Devices Installation

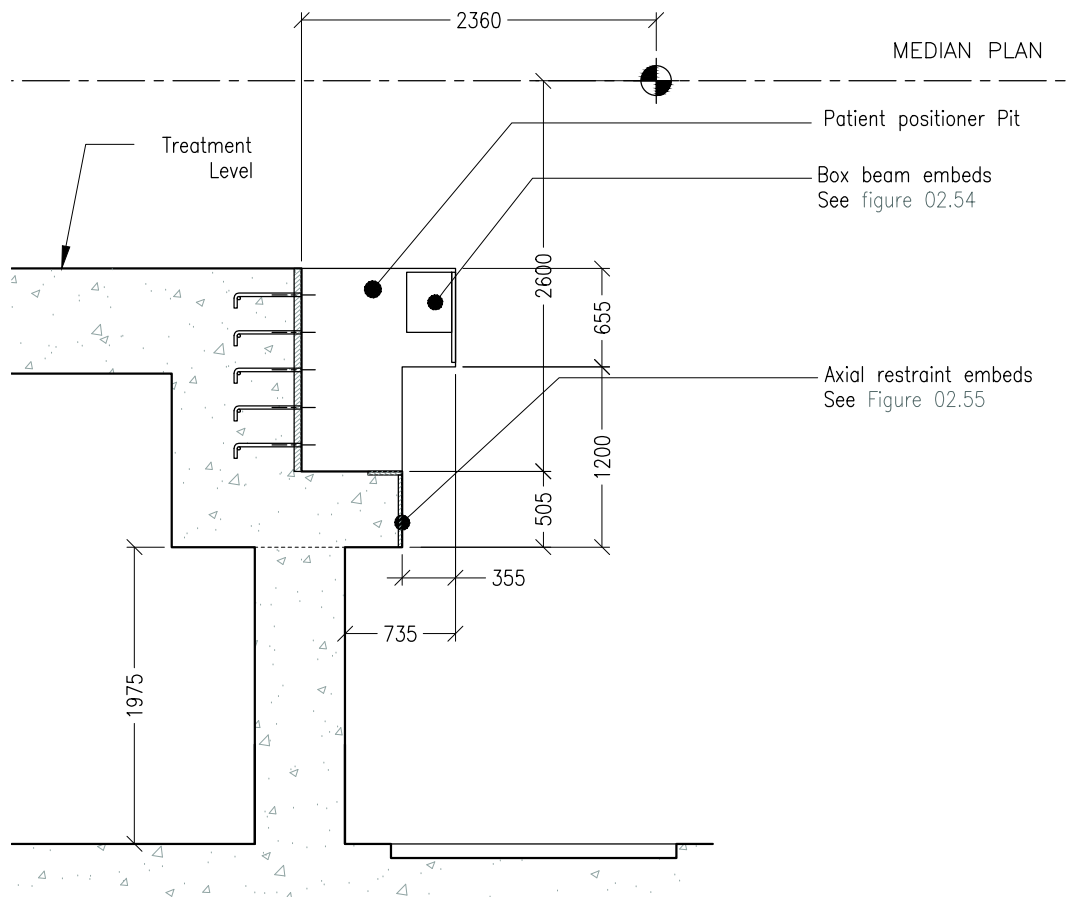
07.42.33.

02.52 A

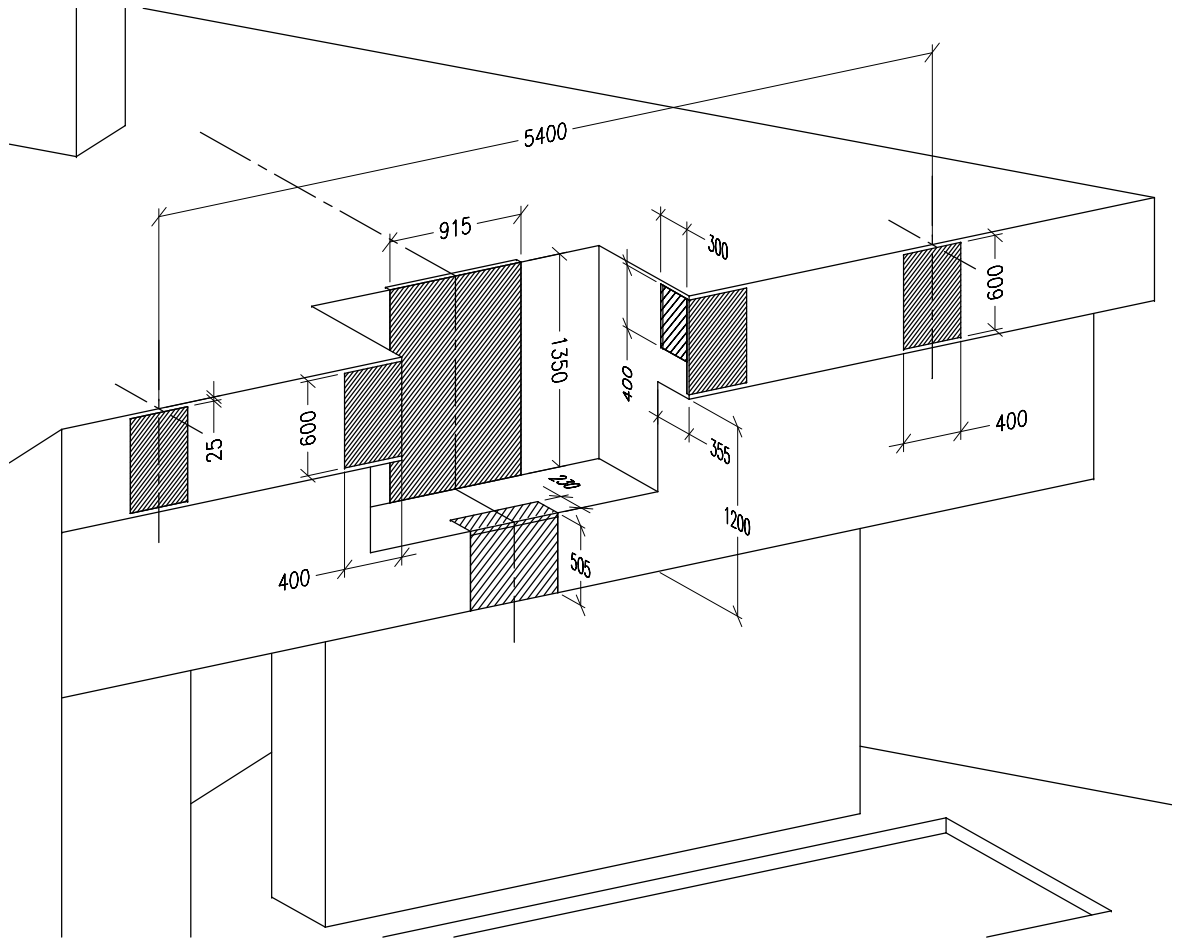


PPS PIT DIMENSIONS

Refer also to figure 02.14 (PPS Load)



SECTION A-A



ISOMETRIC VIEW

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: –
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY

S/PROJECT: TATA HBTF MUMBAI

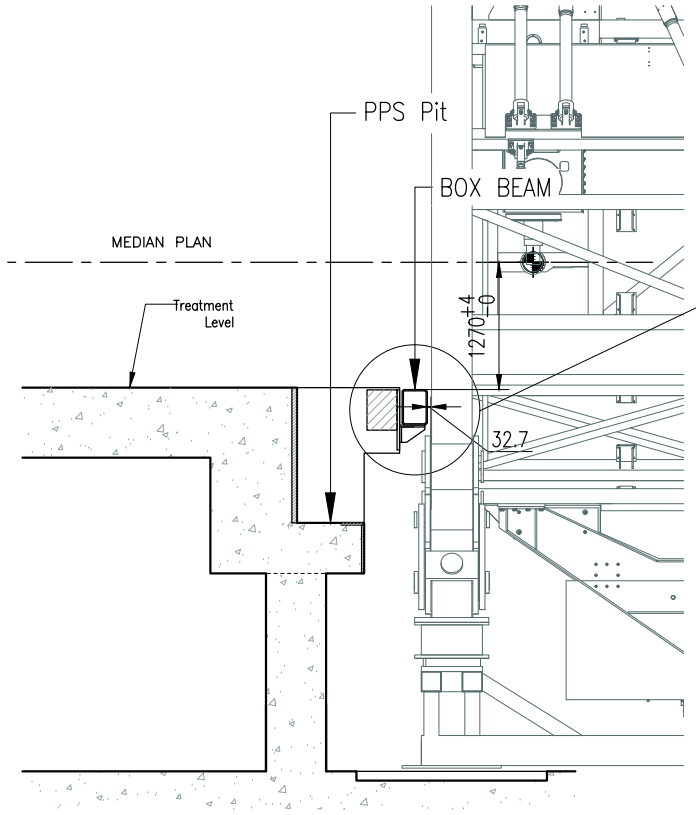
II.
ROOMS

Gantry Treatment Room

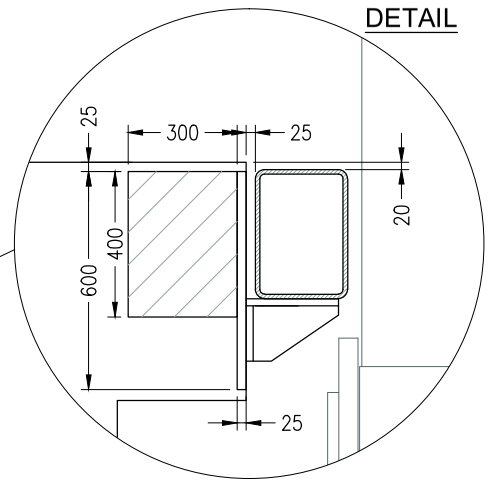
TITLE:
PPS pit embeds

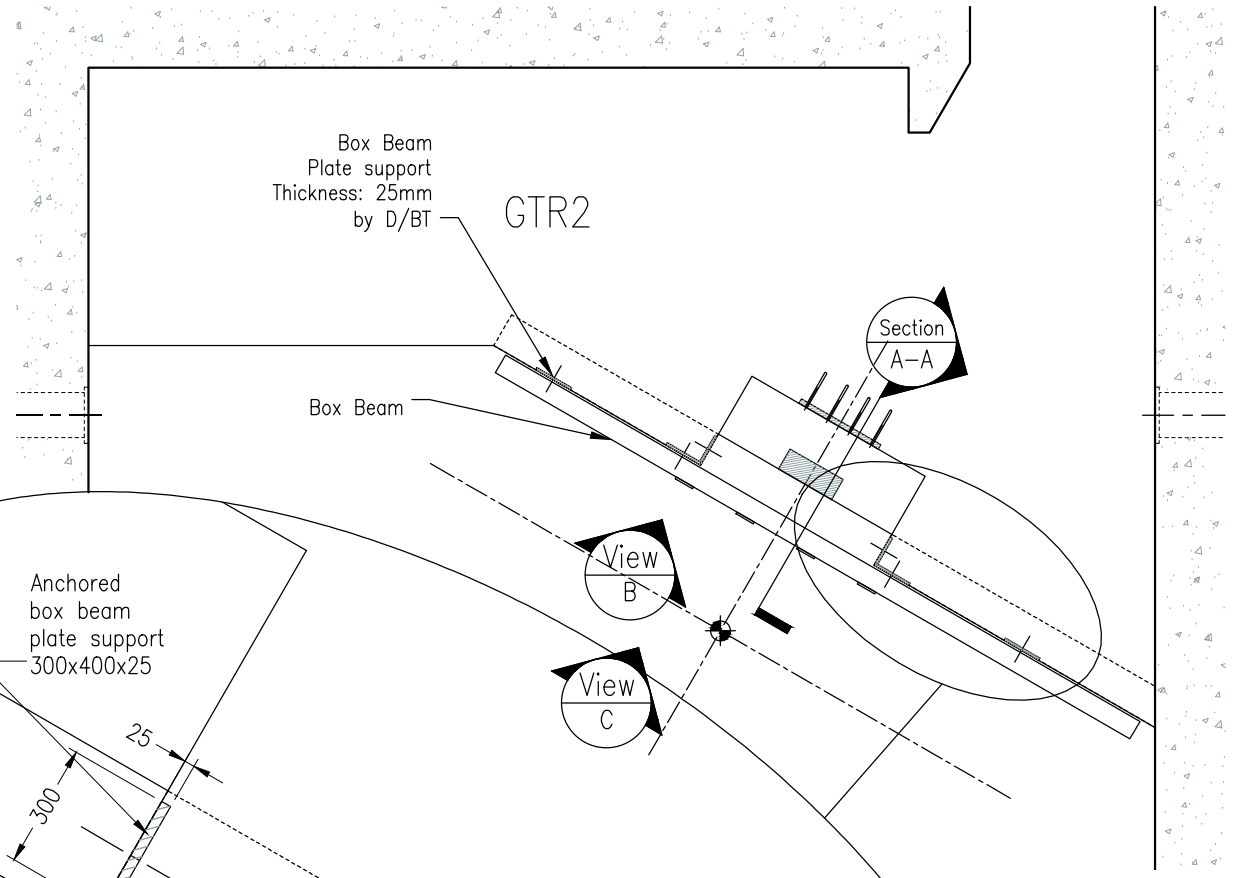
07.42.33.

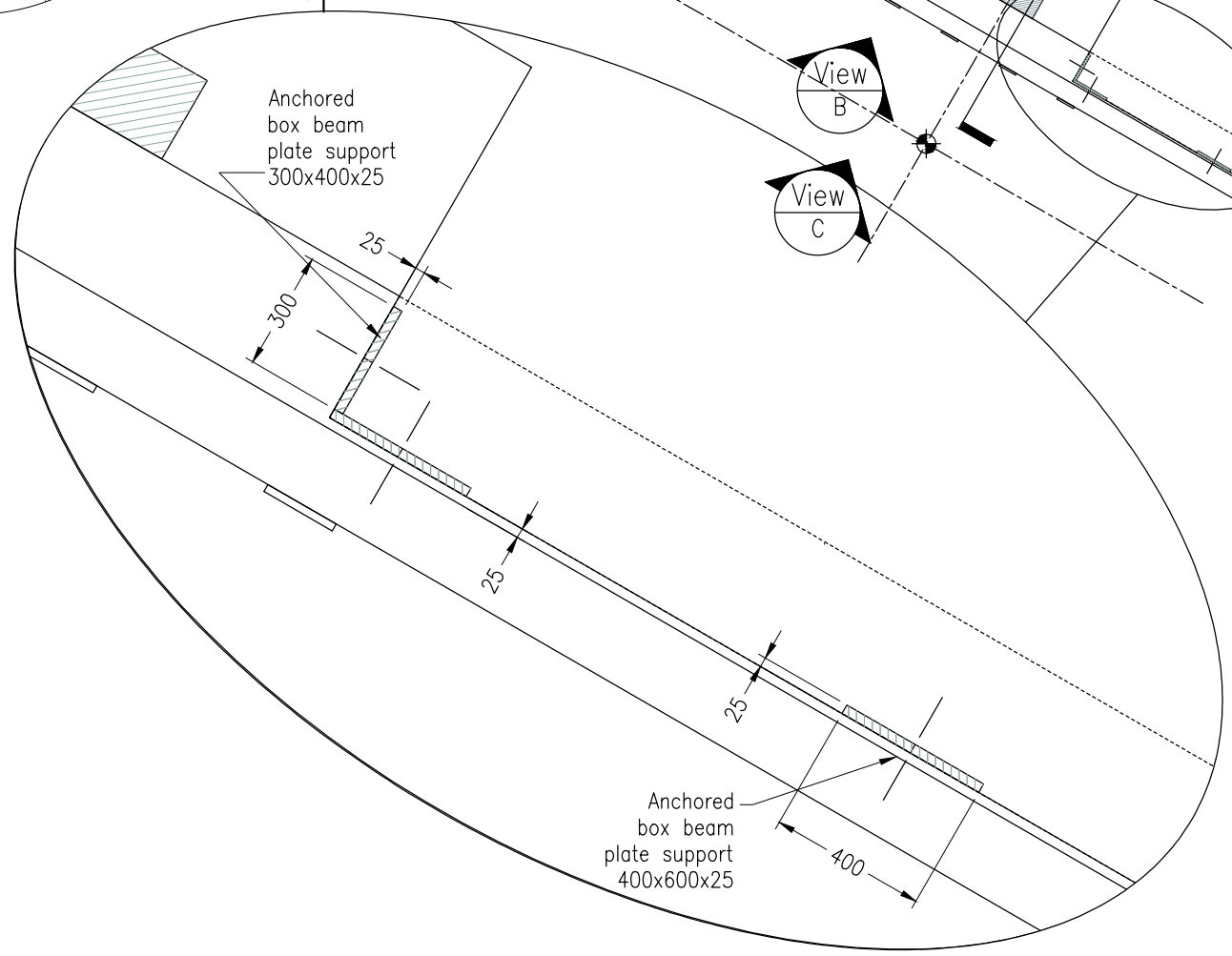
02.53 A

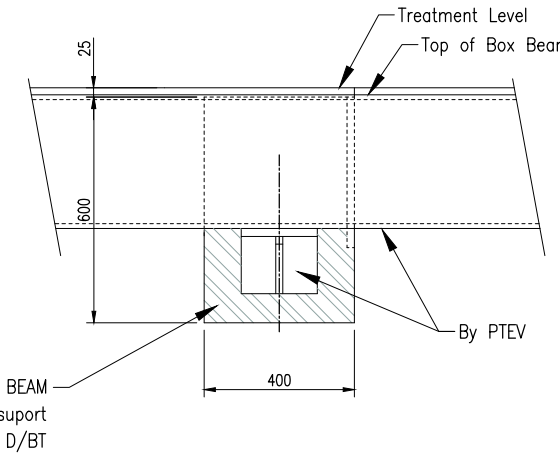


SECTION A-A

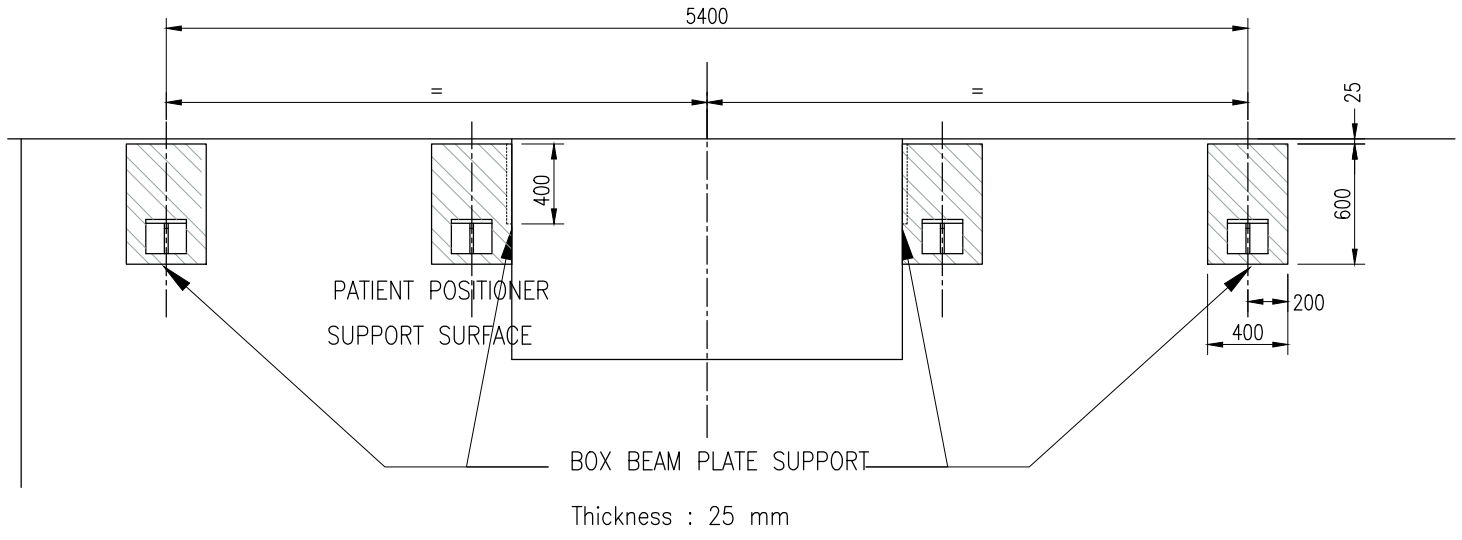








VIEW B



VIEW C

1. The key element in integrating the Gantry Rolling Floor (GRF, see Fig.02.71), the Gantry and the PPS with the Treatment Area is the box beam (a steel beam of square "box" section). The box beam is furnished and installed by the PTEV. The beam spans across the top of the open end of the patient positioner pit and performs several functions:

   1.1. Fills the gap between the edge of the treatment area concrete and the face of the gantry. This construction allows absorbing tolerances of the edge of the concrete floor with respect to the final position of the gantry. Box beam adjustment is realized through shimming.
   1.2. Support the Gantry Rolling Floor structure
   1.3. Support the partition wall between the treatment area in a location allowing it to be essentially flush against the face of the gantry. All portions of this interface except the wall itself will be provided by PTEV.

2. The D/BT shall provide embedded steel plates in the concrete as indicated in these figures.

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/75 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

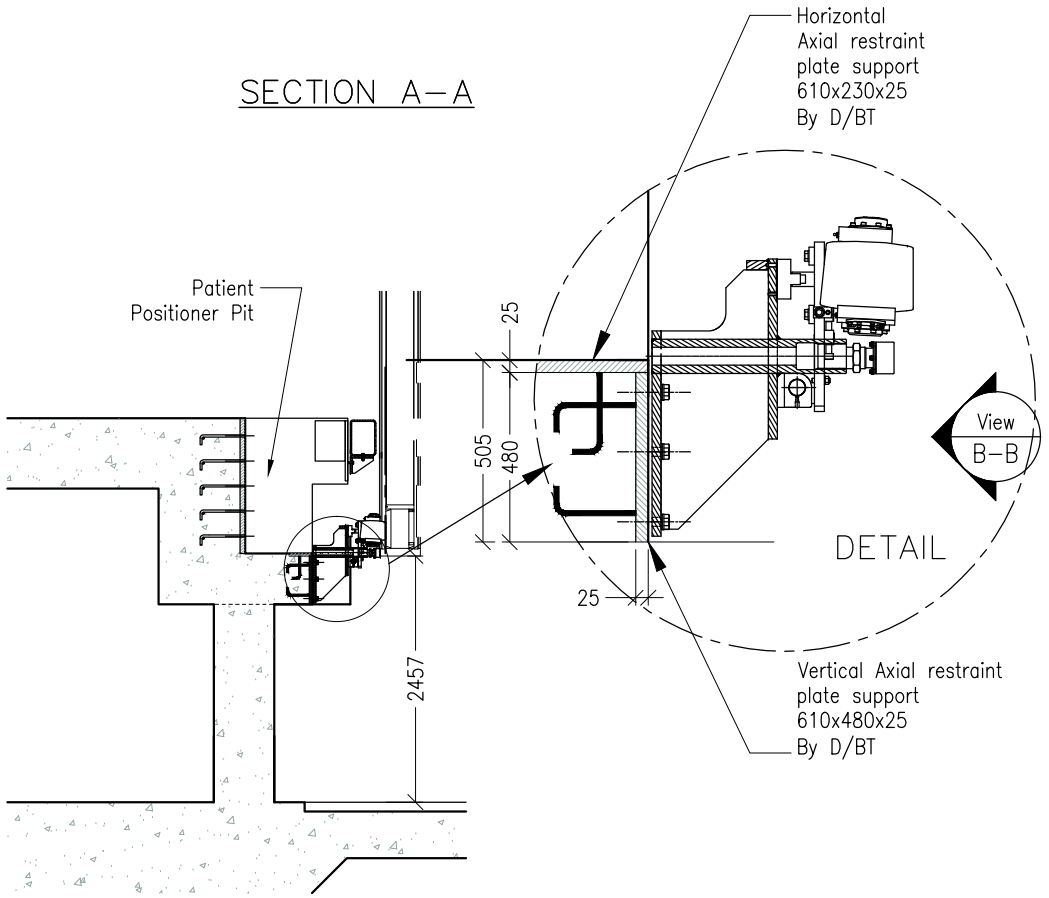
Gantry Treatment Room

TITLE:
Box beam

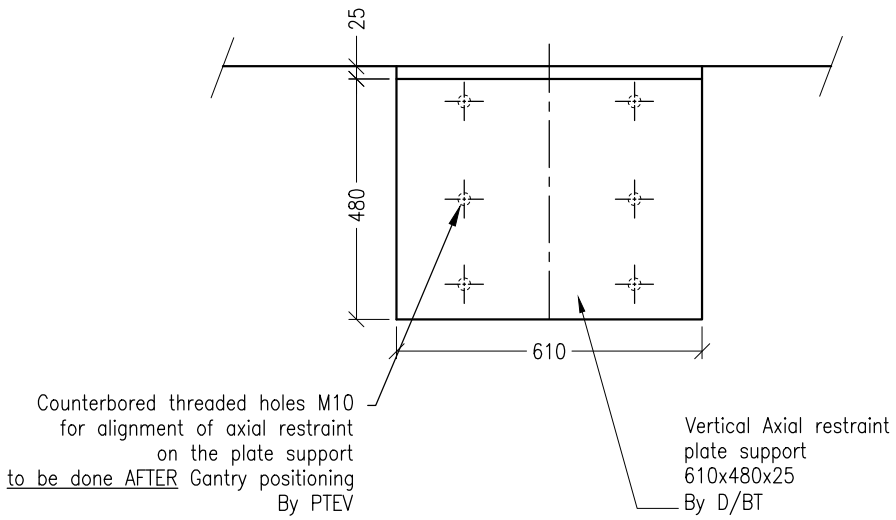
07.42.33.

02.54 A

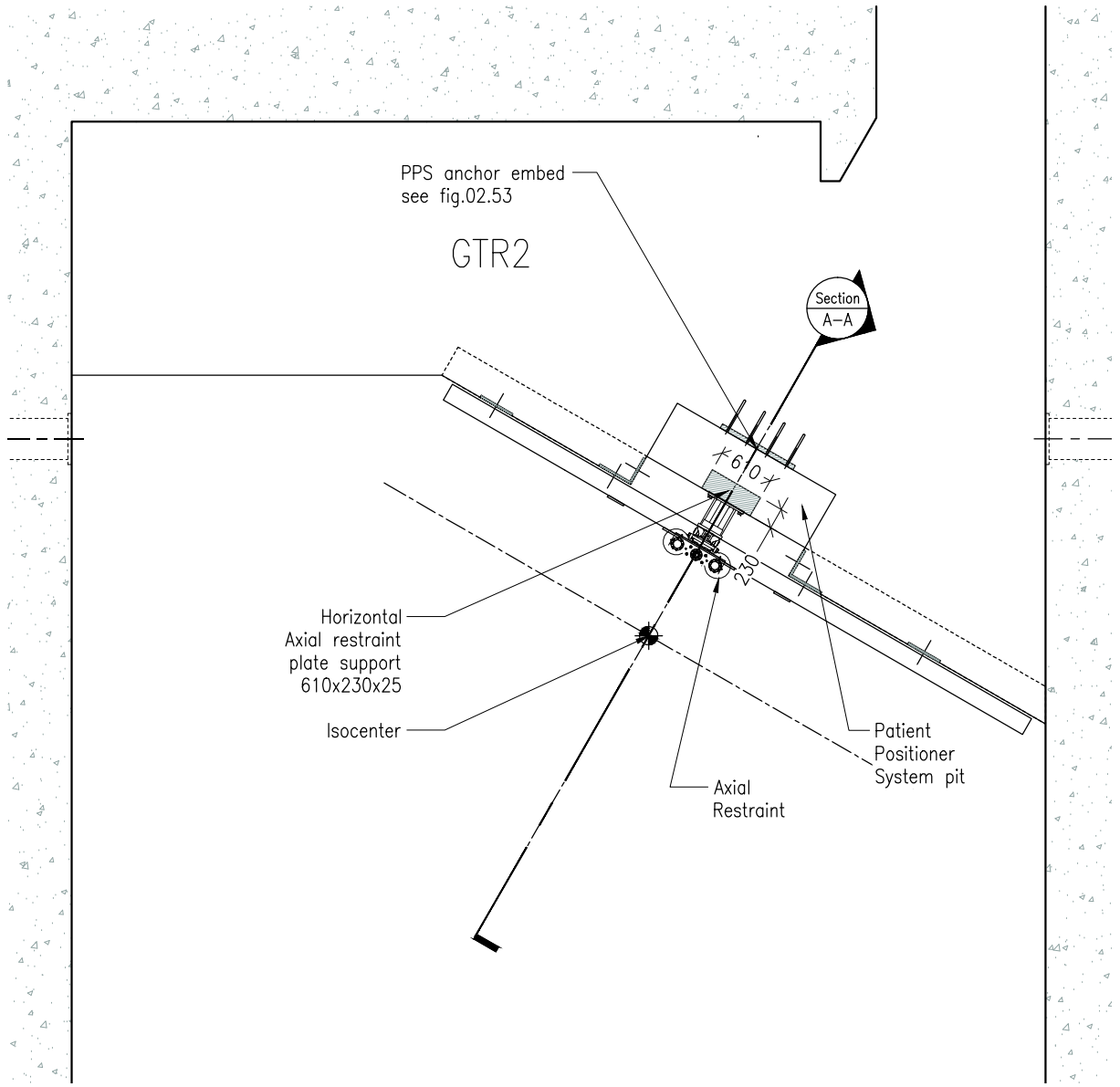
SECTION A–A



View B–B



1. Embeds by D/BT
2. Mounting and installation of the axial restraint by PTEV



S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY

S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

Gantry Treatment Room

TITLE:

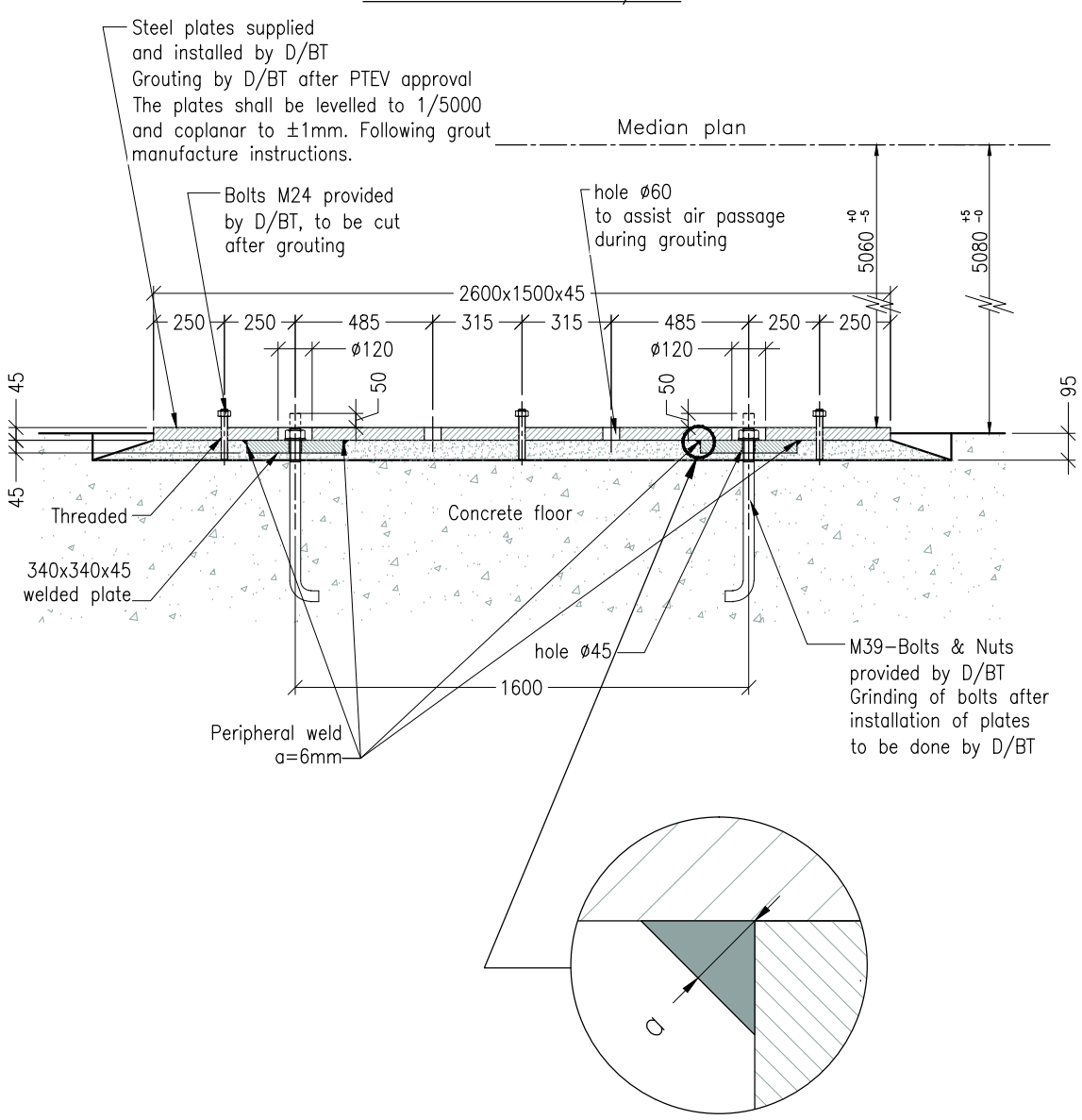
Axial Restraint Plate Support

07.42.33.

N

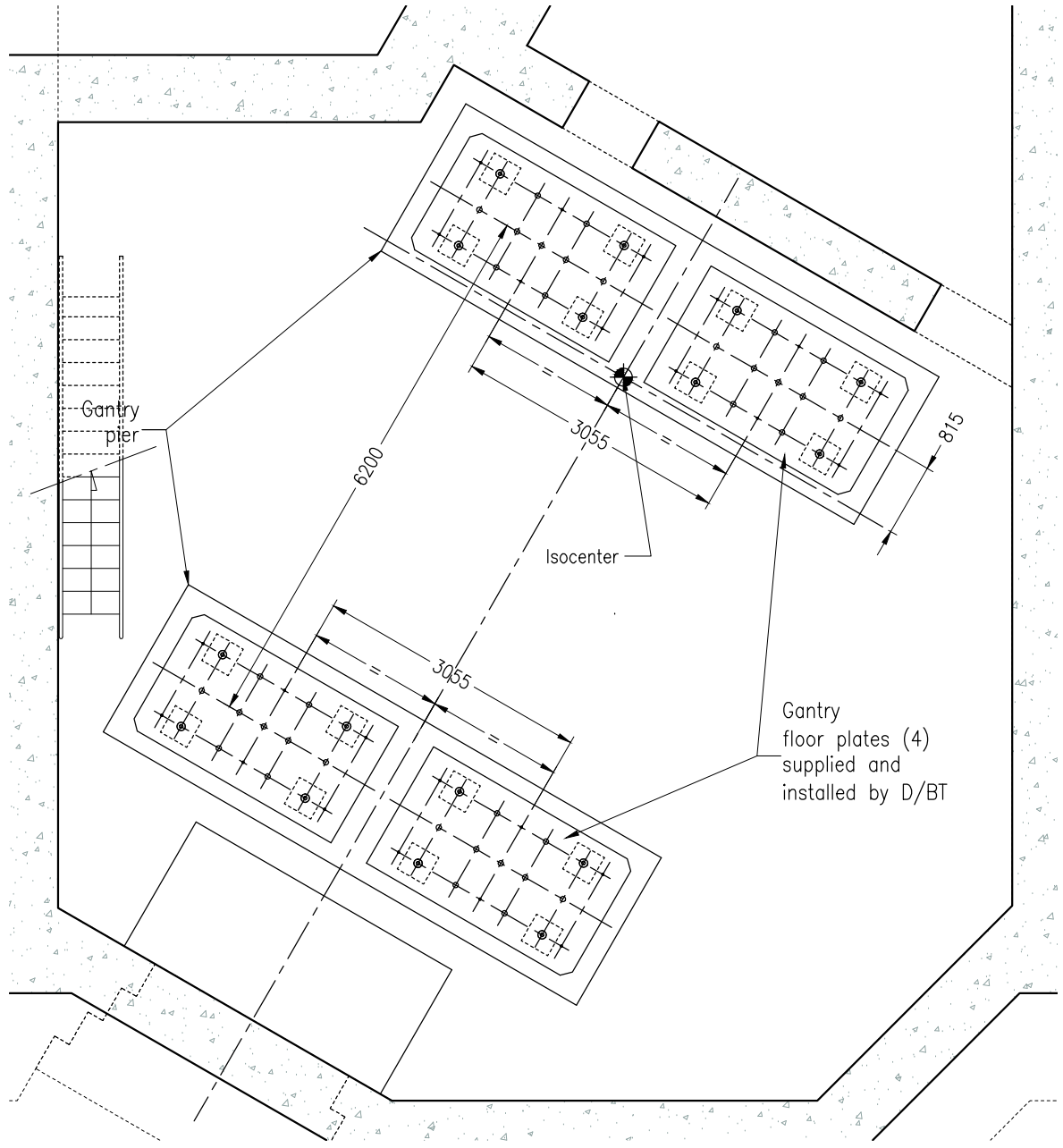
02.55 A

SECTION A–A 1/25



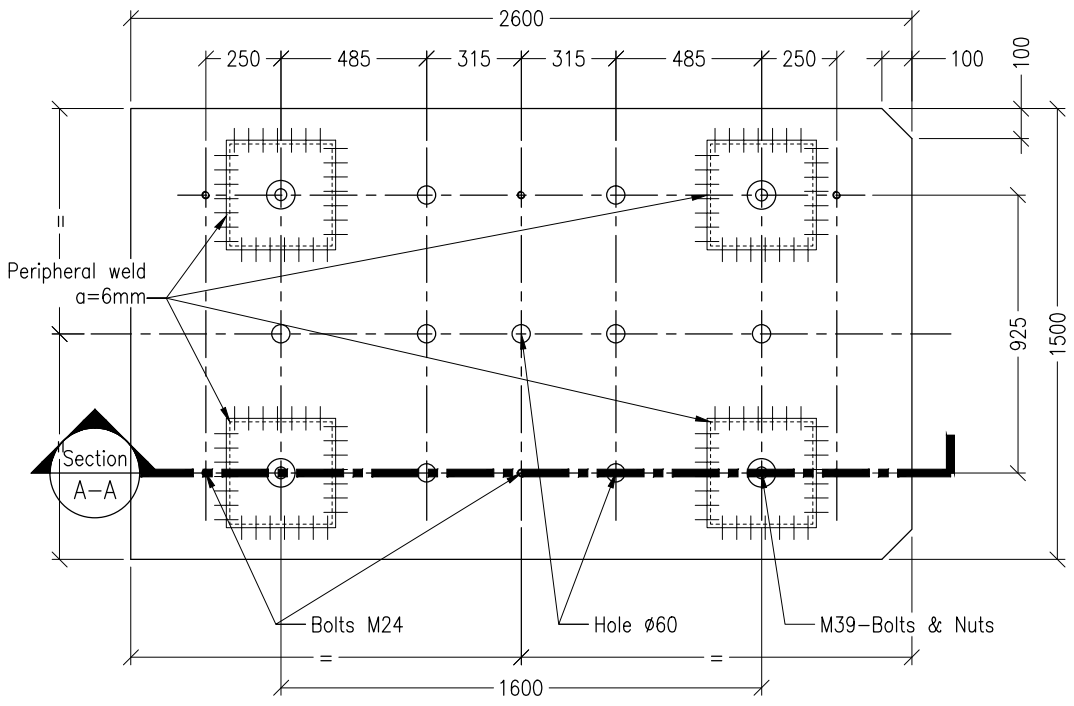
1. Four steel floor plates will be anchored to the floor to support the Gantry skid. These plates will be supplied, installed and leveled by D/BT during building construction and attached by anchor bolts. In case of earthquake, these plates will be subject to additional vertical and horizontal stresses. The transmission of forces from theses plates to the building structure must therefore be carefully studied by D/BT.
D/BT shall furnish, level and grout the four plates.

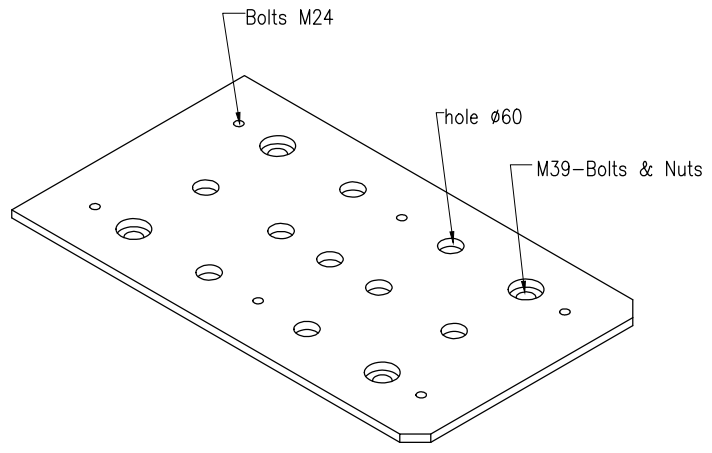
2. Grouting shall be preformed by D/BT after acceptance of plates' position and level by PTEV. These plates shall be leveled to 1/1000, and coplanar to +- 1 mm (+-1/32"). D/BT will use high strengh, non-shrink, non-metallic grout (5000 PSI-35 MPa in 3 days). Protection painting coat shall be foreseen by D/BT for each of the plate.



LOWER GANTRY LEVEL

GANTRY FLOOR PLATE
WELDED ASSEMBLY 1/25





S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

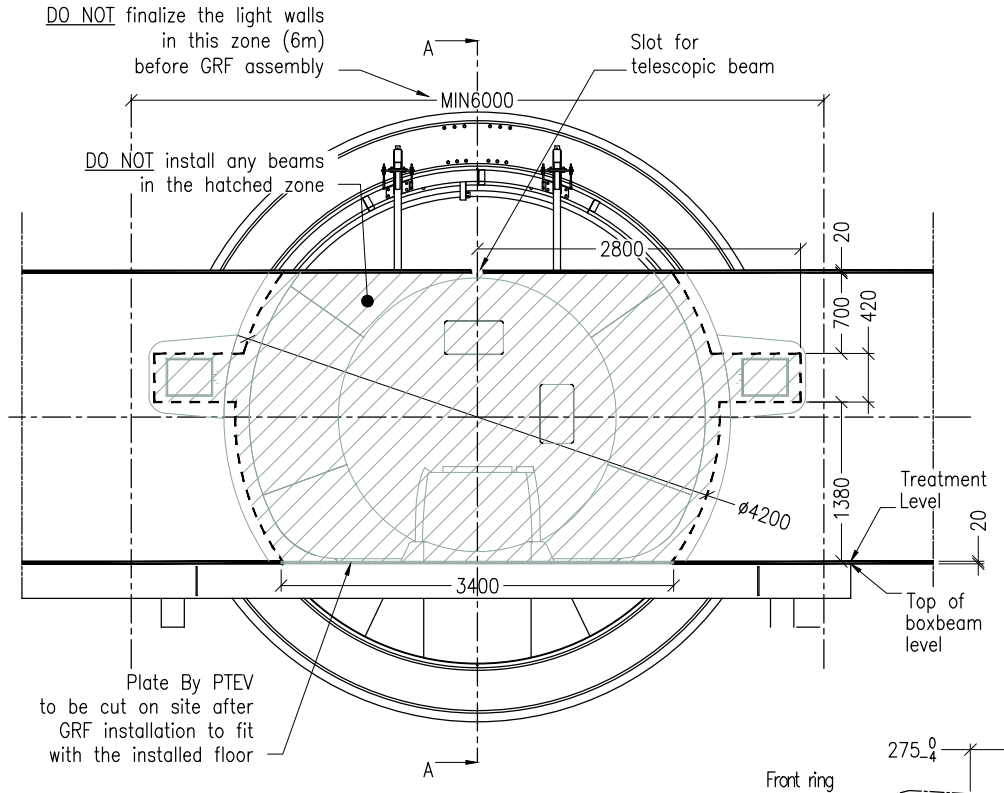
II.
ROOMS

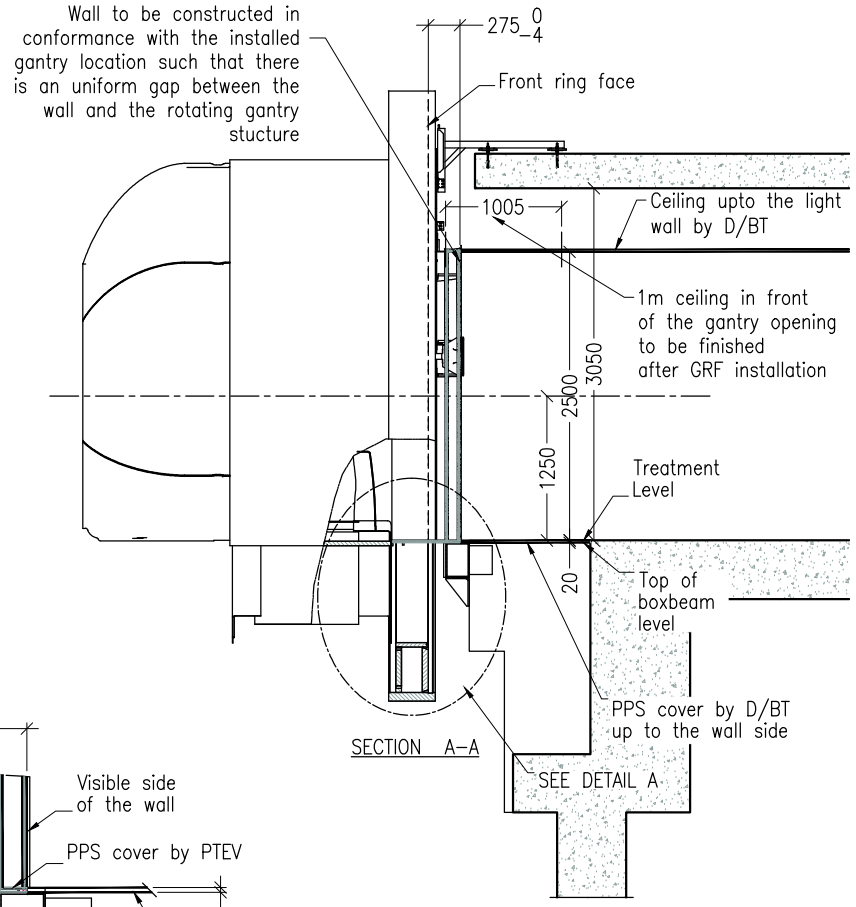
Gantry treatment Room

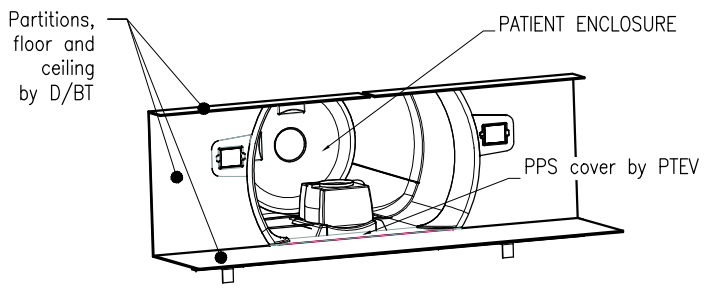
TITLE:
Gantry floor plates position and anchoring

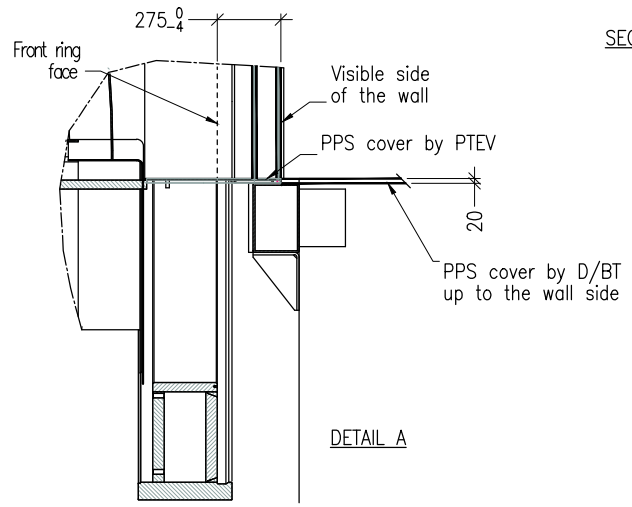
07.42.33.

02.56 A









1. The patient enclosure portion of the gantry is surrounded with panels (furnished and installed by PTEV) such that it is the only part of the gantry visible from the treatment area. The patient enclosure sidewalls rotate with the gantry nozzle. A fixed ring provided by PTEV makes the interface between the rotating patient enclosure and the treatment area walls.

2. Light walls shall be finalized by D/BT after GRF installation. Before GRF assembly, the finishing work on the lateral light walls shall stop at 3000mm (10') min from isocenter , not closer.

3. The 275 mm [-4,+0] (10 ¾" [-⅛",+0]) distance between the front ring surface and the visible side of the light walls is mandatory

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY

S/PROJECT: TATA HBTF MUMBAI

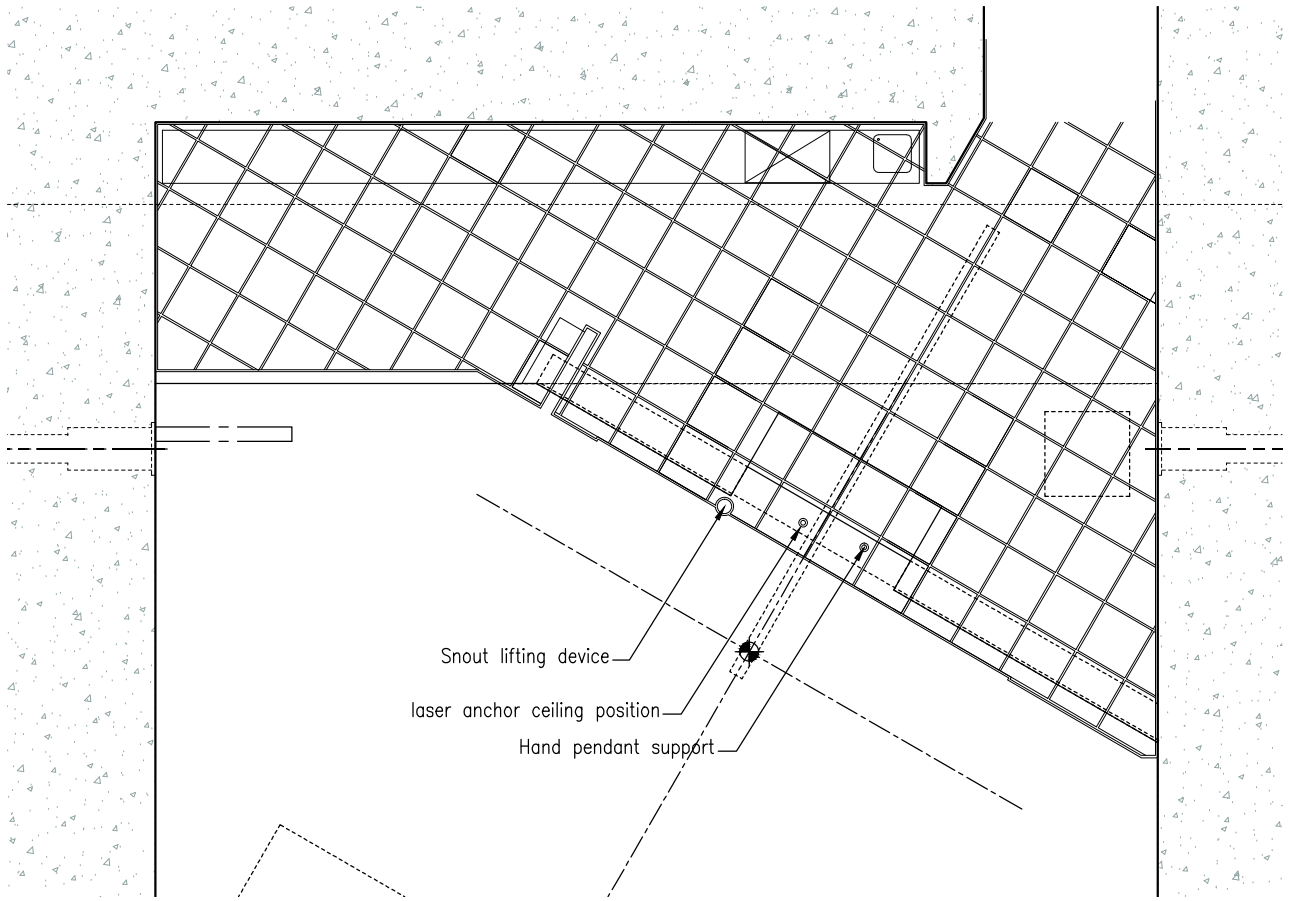
II.
ROOMS

Gantry Treatment Room

TITLE:
GRF,Partition walls, ceiling and floor dimensions

07.42.33.

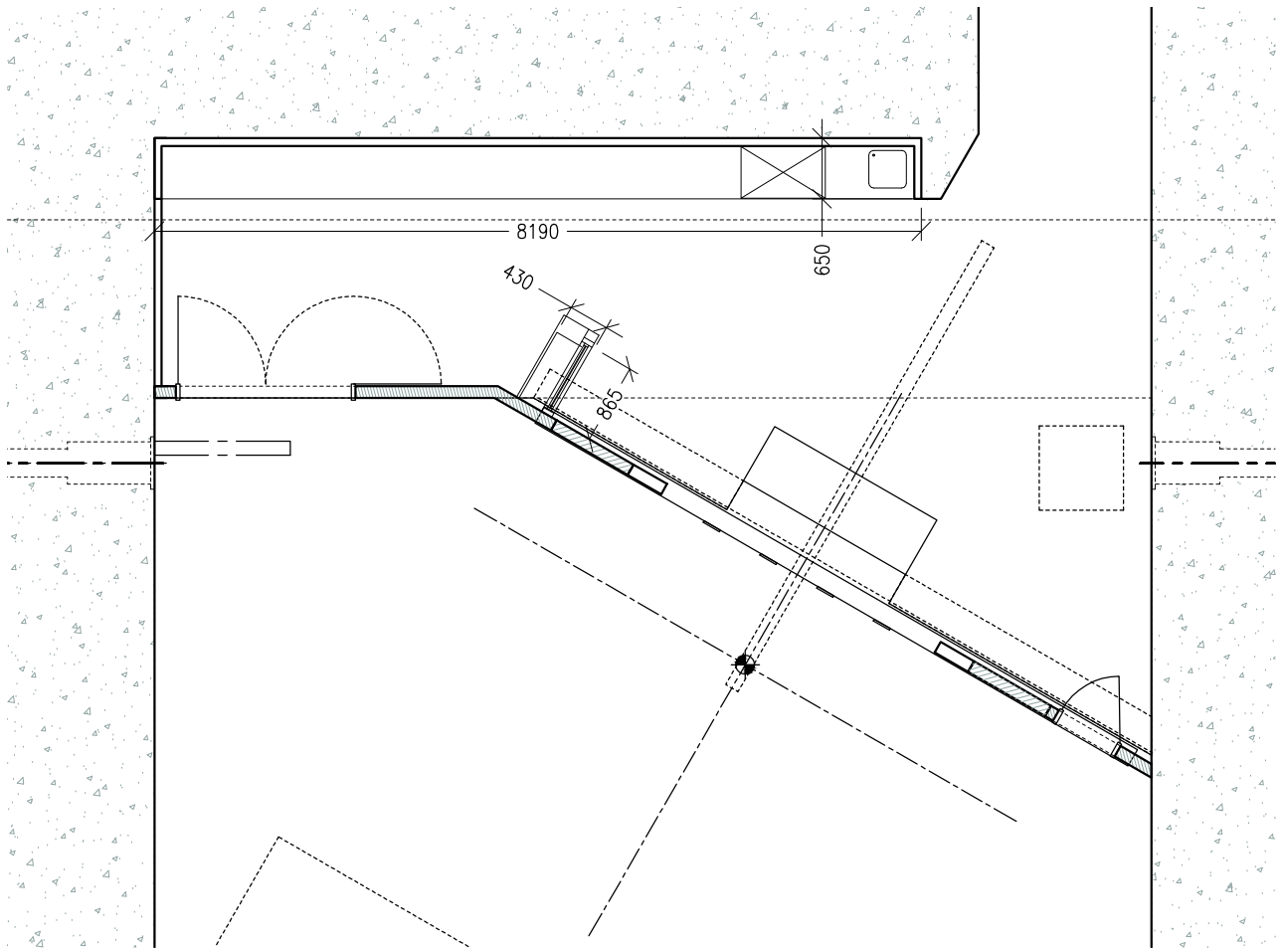
02.71 A



CEILING

1. The treatment area must be finished to present an appropriate clinical appearance. An accessible suspended ceiling will be foreseen and cover the complete treatment area. In order to provide access during Gantry installation and to avoid construction damages, the installation of the suspended ceiling and the finishing of the walls must be done by the D/BT after installation of the equipment.

2. Accessible and dismountable suspended ceiling at 2,5 m (8'-3") from finished floor level. To be placed afer PTEV equipment installation.



LIGHT WALLS

1. A counter and some shelves will be installed and furnished by the D/BT along the south wall of the Treatment room to accommodate computers and screen.

2. Clearance between the countertop and wall mounted cabinets above tablet must be at least 50 cm (1'-8") to install computer and screens.

3. Within the counter, a sink with hot and cold water shall be installed by the D/BT. There shall be access panels on the inside rear of the base cabinets and several holes with grommets in each countertop for access to cabling conduits for future use.

4. Light walls to be coordinated with PTEV

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/100 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

Gantry Treatment Room

TITLE:
PTE Implantation of the Ceiling
-
Light Walls & Furniture

07.42.33.

N

02.72 A

30. OTHER ROOMS

ACRONYMS

PTE	Proton Therapy Equipment
PSR:	Power Supply Room
D/BT:	Design Building Team
PTEV:	Proton Therapy Equipment Vendor
MCR:	Main Control Room
PPS:	Patient Positioning System
EMC:	Electro Magnetic Compatibility
BOD:	Building Occupancy Date
WCR:	Water Cooling Room
TCR:	Treatment Control Room
TR:	Treatment Room
VDU:	Video Display Unit
KVM:	Keyboard Video Mouse
TBD:	To Be Determined
TCS:	Therapy control system
UPS:	Uninterruptible Power Supply
TPCR:	Treatment Planning Computer Room
TPS:	Treatment Planning System
OIS:	Oncolology Information System
QC:	Quality Control

TABLE OF CONTENTS:

Refer also for additional technical specifications to Chapter III: Installation, Chapter IV: Cooling & Gases, Chapter V: Electrical set, Chapter VI: Other Technics & Chapter VII: BOD Requirements.

S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: --
SCALE: (A3)
DIMENSIONS: mm
TOLERANCES: --

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

Other rooms

TITLE:
Presentation

07.42.33.

30.00 A

31. POWER SUPPLY ROOM

The Power Supply Room (PSR) is located on the upper level, along the wall of the gantry vaults. See ***Upper Level*** drawing on this figure .

The PSR contains PTEV power supply cabinets distributing the electrical power for the PTE.

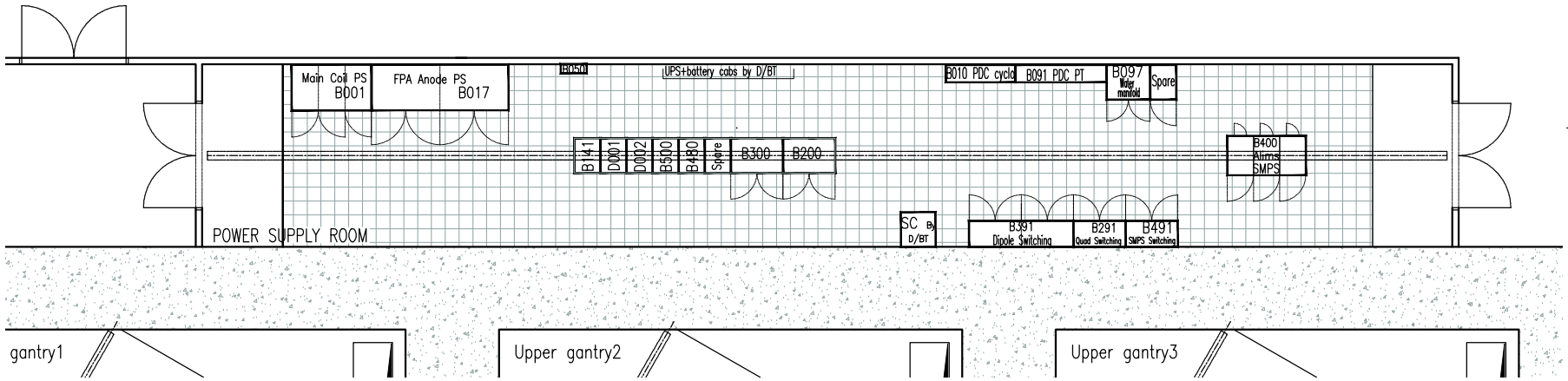
The electrical power for the PTEV power supplies comes from the building electrical “hookups” installed by the D/BT. Additional cabinets for control and measurements are installed by PTEV in the PSR as well. Refer also to ***Chapter V (Electrical Set)*** .

The PSR installation is described later in the IBD ***Chapter III (Installation)*** .

The D/BT shall provide and install stands to support the cabinets. The weights and dimensions of PTEV PSR main components are given in ***Figure 52.11 - (Cabinets Numbering)***. Confirmation of the power supply cabinet dimensions shall be provided 3 months prior to the delivery of the Power supply cabinets to allow the proper fabrication of the support stands to be furnished and installed by the D/BT as described below.

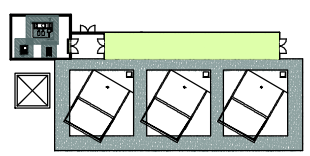
The following is required:

1. The PSR shall be minimum 3,8 m (12'-6”) wide .
2. A proper height will be given to accommodate the overhead HVAC duct work, sprinkler piping if required, electrical lighting fixtures, power supply support frames and the height of the power supply cabinets. This height shall comply with local electrical codes and clearance requirements between, around, above and in front of cabinets.
3. D/BT is responsible of the cooling of the Power supply room. The D/BT cooling installation devices shall be submitted and their location in the PSR coordinated with the PTEV.
4. D/BT shall provide moisture detection system in the PSR under the raised floor, after the installation of the PTE. The type of moisture detection system shall be submitted to PTEV for approval prior to purchasing.



UPPER LEVEL

5. To accommodate the installation of the powers supplies support and cabinet, the D/BT will provide and install one overhead monorail beam and chain hoist (capacity: 7715 lbs/3500kg). The monorail beams shall be installed as represented on PTEV drawings. The Light fixture will be not lower than the monorail beam. The beam elevation and size shall take the clearance for overhead duct work and piping into account. The bottom of the hoist hook will be at 275 cm (9') above the raised floor. The D/BT will provide a load test report for this equipment to PTEV.
6. The PSR must be fully enclosed by concrete and/or metallic walls and doors so as to be sufficiently shielded for EMC radiation. No plasterboard/sheetrock allowed separating from external world except if a metallic mesh is incorporated under the gypsum board finish material.
7. No other equipment can be installed in the PSR without the PTEV agreement. Additional space is foreseen for future extension of the facility. The D/BT must verify that there is sufficient space to install any additional equipment that is in the Customer or D/BT scope.
8. A double entrance door (minimum aperture: 240 cm (8') wide x 250 cm (8'-4") high) shall be installed at both sides of the room to allow entrance of the power cabinets through the corridor. The doors will be lockable with auto-closing and a possibility to keep them open.
9. Antistatic, non conductive raised floor is required in the Power Supply Room
   D/BT shall ensure that the floor has sufficient load bearing capacity of 2 tons (±4,000 lbs) rolling static load even when cut outs are made in floor tiles to allow the passage of cables. The free height of the raised floor will be 60 cm (2').
   In order to facilitate the installation and cabling of the cabinets, the D/BT is requested to install the raised floor prior to the cabinets and cabling by PTEV.
10. The raised floor will be composed of vented panels on 25% of the free surface if compliant with local regulation and ventilation system.
11. The D/BT will provide and install steel support frames for each PS cabinet. These support frames shall be anchored by the D/BT on the concrete slab below the raised floor. Care shall be taken to adapt the stands/floor interface to allow air circulation below the cabinets, depending on the chosen ventilation system. Details of the support frames are given in ***Figure 52.51 - (Power Supply Room Cabinet Stands)*** . The confirmation of the final dimensions for the support will be given 3 months prior the installation .
12. D/BT may propose alternative flooring system adapted to the cabinets weight, the ventilation system, the cabling and other PSR requirements. This proposal must be submitted to PTEV for approval.
13. The finished level of this raised floor shall be the same as the outside ground level (at the entrance door). The cabinets will be brought into the PSR through this entrance door.
    If the raised floor is higher than this outside level, a slope of maximum 10%, in the axis of the double door, will be foreseen by the D/BT in order to ease installation of the cabinets. Lifting beam or other solutions may be submitted by D/BT.
14. The conduit and cable tray requirements for the PSR are outlined in ***Chapter V (Electrical Set)***.
    All cable trays, floor and wall openings, and conduits shall be supplied and installed by the D/BT. All electrical services going through the PSR will be installed in cable trays under the raised floor.
15. All electrical conduits for PTE cabling shall be permanently tagged and numbered at each end by the D/BT, using the PTEV convention. See from ***Figure 52.41 (Cabling:General comments) to 52.48 (Cable trays in cyclo vault, ESS/BTS)*** .
16. A list of the conduits lengths or close estimation (±2 m (±7')) based on figure 52.43 shall be transmitted by D/BT to PTEV 6 months before BOD.
17. As some power supplies are water cooled, floor drains and adequate slopes to them shall be provided in the structural floor slab under the raised floor.
18. The cables will be installed and the installation will be verified to comply with the requirements of the IEC 60204 standard
19. D/BT will provide easy and covered circulation for personnel between the PSR and the MCR.
20. Dust shall not penetrate in a quantity to interfere with satisfactory operation of the apparatus or to impair safety.
21. The D/BT shall provide a high grade epoxy paint finish on all walls, slabs, floors and ceilings including below the raised flooring to prevent dusting. The epoxy paint type shall be submitted to PTEV for approval prior purchasing.
22. The final version of PSR (implantation, cabinets numbering and stands) will be released by PTEV to D/BT at the latest 6 months before BOD.



S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: --
SCALE: 1/150 (A3)
DIMENSIONS: mm
TOLERANCES: --

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

Other rooms

TITLE:
Power Supply Room

07.42.33.

31.01 A

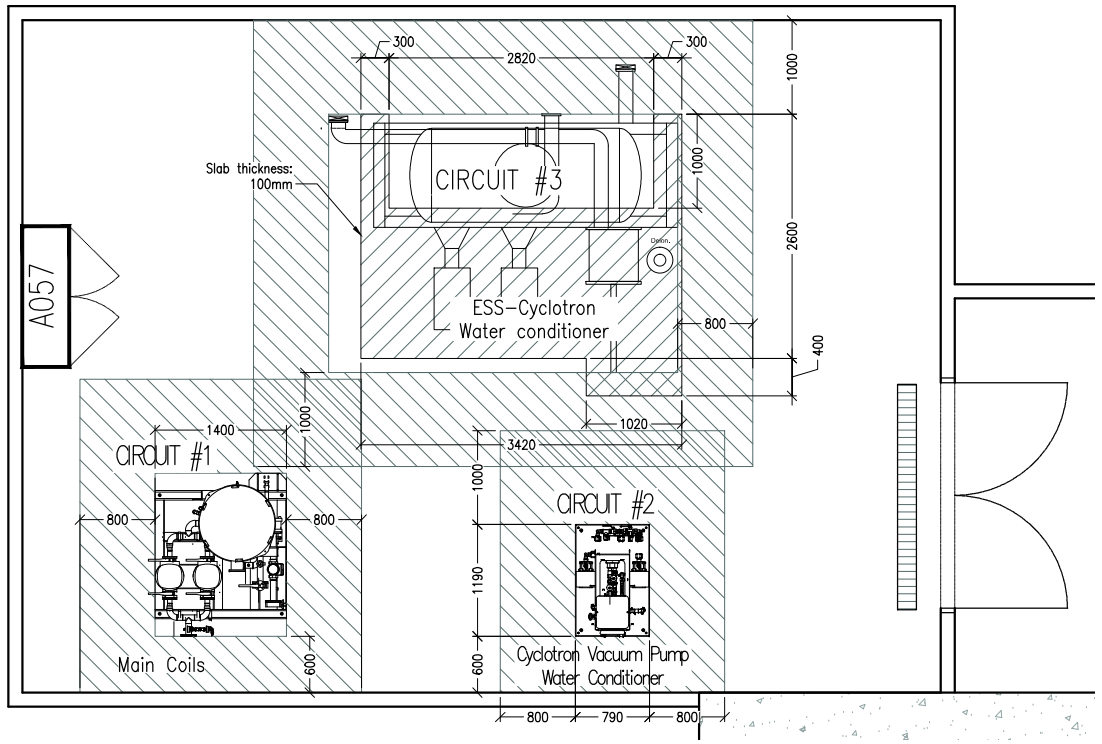
32. WATER COOLING ROOM

A typical layout of the water-cooling room is shown and detailed here. Indicative values for weight and dimensions are given in ***Table 2: Cooling Room Main Components*** on this figure.

Refer also to ***Chapter IV (Cooling and Gases)*** for further technical details and water conditioners description.

The following is required:

1. A double door 240x240 cm (8'x8') shall give a direct access to the Water Cooling Room. Doors will be lockable with auto-closing and a possibility to keep them open.
2. Sufficient space to install three water conditioners with dimensions and weights found in ***Table 2: Cooling Room Main Components***.
3. A free area of 100 cm (3'-4") (in front of the pumps) to replace pumps or heat exchangers in front of each water conditioner and sufficient free space around for installation and maintenance. See ***Water Cooling Room*** drawing here for dimensions.
4. A free area of 90 cm (3') above all Water Conditioner to access to the tank.
5. D/BT will provide 10 cm (4") height concrete maintenance pad for PTEV water cooling groups for circuit #3. This pad will be flat and levelled.
6. PTEV advises installing a portable handling device or some pad eyes offering some lifting points, capacity 500kg (1100 lbs.) above the three water conditioners and movable from there to the free areas beside the water conditioners.



WATER COOLING ROOM

Dimensions and positions of the water conditioners may be subject to small changes.
Min. height: 3760 mm ceiling or structure.

Slab

Clearance

7. A direct access 240 cm width by 240 cm high (8' x 8') from the outside of the building to the water-cooling room is required.
8. The D/BT shall ensure that there are water drains at the low points able to evacuate the water of the water tank (1000 liter), in case of leakage before the water reaches a level where equipments and other rooms could be damaged.
9. A floor trench drain will be installed in front of the door
10. If the Water Cooling Room is adjacent to the PSR, a wall shall separate the cooling room and PSR in order to avoid flooding from cooling room to PSR.
11. D/BT shall provide empty conduits connecting PSR and Water Cooling Room (see also ***Chapter V (Electrical Set)***
12. All the details concerning the piping will be described in ***Chapter IV (Cooling and Gases)***.
13. Noise insulation/sound proofing in walls and ceiling. D/BT shall deliver labels requesting to wear hearing protecting device at the room entrance, except if it complies with IEC 60601-1 Clause 9.6 related to noise levels. This standard defines following requirements, among others
    - Noise shall be less than 80 dBA in normal use (average).
    - No exposure to sounds of more than 140 dB in any case (peak).
14. Normal potable city water supply with a hose or flexible pipe for filling of the primary circuits (flow: >2 m3/h) (>528 gal./h) shall be provided in the Water Cooling Room with 1 pipe and valve to each group. (water spec. see ***Table1*** below).

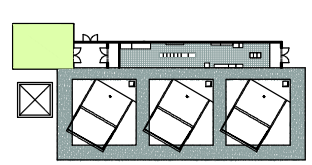
Table 1 :

S.No.	Parameter	Standards	Rationale/Remarks
1.	pH range	6.5-8.5	The range is conductive for propagation of aquatic species and restoring natural system
2.	Turbidity	30 NTU	Reasonably clear water for Recreation, Aesthetic appreciation and industrial cooling purposes.
3.	Dissolved Iron	0.5 mg/l or less	It is desirable to have the (as Fe) collective concentration of dissolved Fe and Mn less or equal to 3×10^{-5} pound/foot^3 to avoid scaling effect.
4.	Dissolved Manganese(as Mn)	3×10^{-5} pound/foot^3	

15. Prior to the installation of the PTEV Cyclotron, which indicates the beginning of the PTE installation at the BOD (Building Occupancy Date), PTEV shall install the PTEV Chilled Water Equipment in The Water Cooling Room.
16. The D/BT must pressure test all water circuits before BOD. After installation of the water conditioners, the D/BT has to finish the water lines in the WCR. The D/BT has then to pressure test again and to flush. D/BT has to flush and reflush until there is no longer any waste in the water lines to replace or clean all filters and strainers and to receive approval from PTEV.
17. D/BT shall provide a double 220 Volts (110-120V US) outlet in the WCR within 90 cm (3') of each water conditioner's heat exchanger at min. 45 cm (1'-6") above the finished floor.
18. All cable trays in the WCR will be supplied and installed by the D/BT.

Table 2: Cooling Room Main Components

ITEM	QTY	WEIGHT (kg / lbs)	HEIGHT (cm / in.)	WIDTH (cm /in.)	DEPTH (cm / in.)	INSTALL ROUTE	REPLACE ROUTE
Main Coils Water Conditioner	1	640 / 1410	231/91	140 / 55	174 / 68	R9	R9
Vacuum Water pump	1	70/154	113/45	79/31	119/47	R9	R9
Cyclo /ESS /BTS/Gantries Water Conditioner	1	2600 / 5732	267 / 105	332 / 130	328 / 129	R9	R9
De-Ionization Column	2	68 / 150	170 / 67	dia 25,4 / 10		R9	R9



S.A. ION BEAM APPLICATIONS

VALIDATED BY:	PV	
CHECKED BY:	QBA	
DRAFTMAN:	LCHEN	
MODIFICATION:	Original issue	
DATE:	30/04/15	
REV:	A	

MATERIAL: –
SCALE: (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

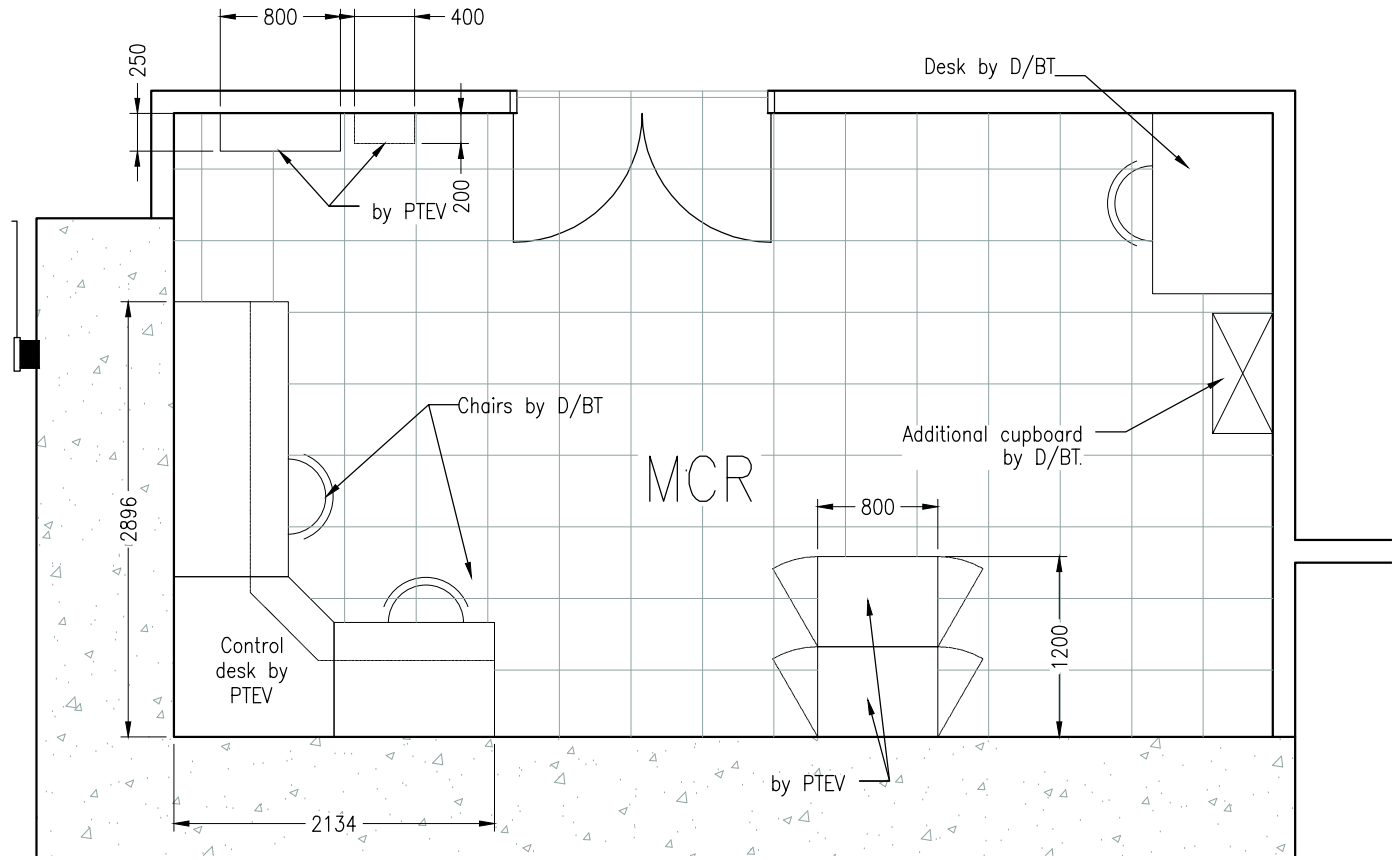
II.
ROOMS

Other rooms

TITLE:
Water Cooling Room

07.42.33.

32.01 A



33. MAIN CONTROL ROOM

The Main Control Room (MCR) is designed to accommodate the equipment shown in this figure and must be compatible with good ergonomics. Refer also to ***Table 1: MCR Main Components*** hereunder.

The following is required:

1. An antistatic raised floor (computer floor type) with free height of 30 cm (1'). It will be adjusted to the corridor level.

2. D/BT will provide moisture detection system under the access floor, after the installation of the PTE.

3. A floor drain shall be installed under the MCR floor.

4. The door aperture shall be a minimum of 150 cm (5') wide x 200 cm (6'-8") high, in order to allow the entrance of the cabinets and the control desk components into the room.

5. PTE cable conduits running from the other rooms will end under the raised floor. Cable trays shall be installed under the raised floor in order to support these cables running between the conduits, the cabinets and the control desk. See also ***Figure 52.47 - MCR Cable Trays***.

6. Additional equipment for Customer or D/BT scope may be installed in the MCR after PTEV agreement only. The D/BT must then verify that there is sufficient space to install it without interference with PTEV equipment.

7. Before installation of the Electrical and Power Supply Cabinets, D/BT will provide support to PTEV to cut holes in the raised floor or adapt it in order to pass the cables through the raised floor under each cabinet. More information on the exact location of the holes will be provided at installation.

8. There will be a suspended dismountable ceiling, approx. 250 cm (8'-3") height measured from finished floor level.

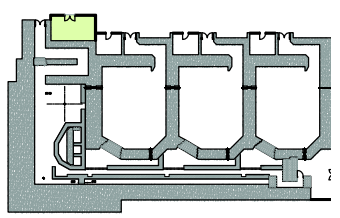
9. The cables will be installed and the installation will be verified to comply with the requirements of the IEC 60204 standard

10. The walls and floors below the raised computer flooring shall receive a high grade epoxy finish to prevent from dust. Walls above the raised floor shall be finished per the Room finish schedule.

11. D/BT shall install 1 additional desk (min.120 cm x 80 cm (4'x2'-8")) and a cupboard (min.80 cm x 40 cm (2'-8"x1'-4")) for documentation files storage and radioprotection equipment.

Table 1: MCR Main Components

ITEM	QTY	WEIGHT (kg / lbs)	HEIGHT (cm / in.)	WIDTH (cm / in.)	DEPTH (cm / in.)	INSTALL ROUTE	REPLACE ROUTE
Safety Syst. Cabinet (SRCU)	1	70 / 154	80 / 32	80 / 32	25/10	R5	R5
PTEV System Cabinet	2	317.5 / 700	190.5 / 75	58 / 23	81 / 32	R5	R5
Control Desk (dismountable)	1	1588 / 3500	267 / 105	442 / 174	221 / 87	R5	R5



S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: 1/50 (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
SUBPROJECT: TATA HBTF MUMBAI

II.
ROOMS

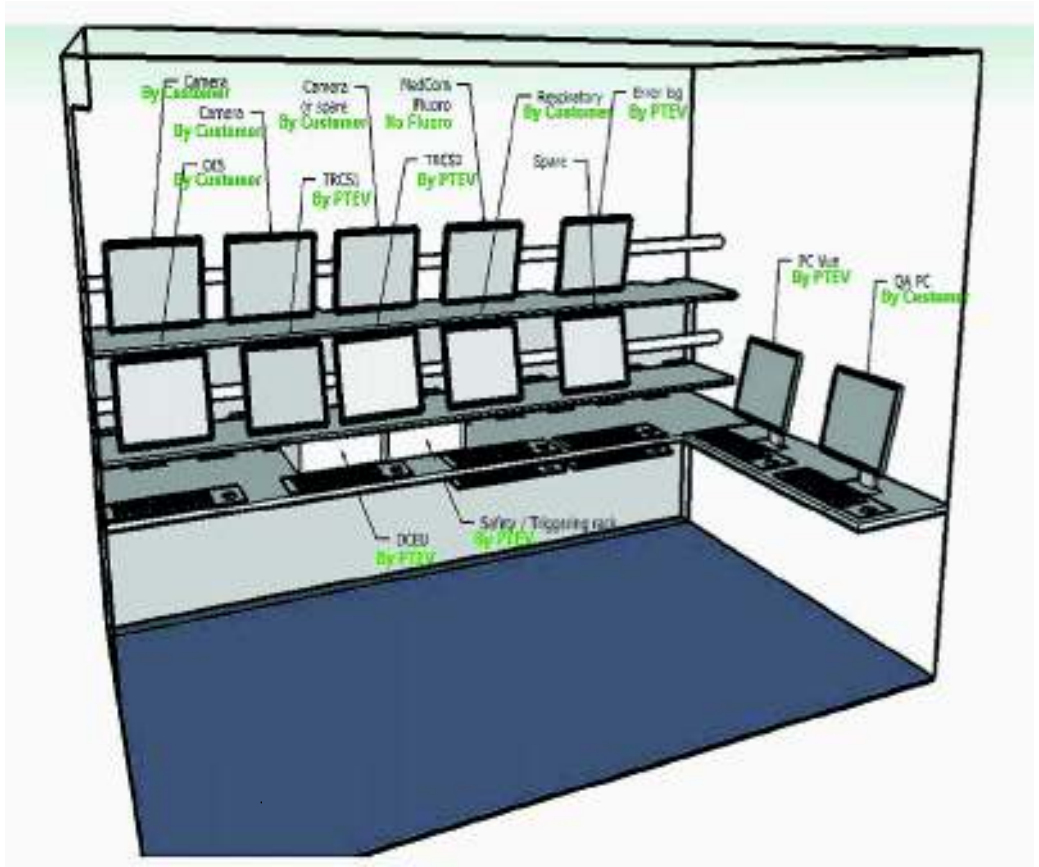
Other rooms

TITLE:
Main Control Room

07.42.33.

N

33.01 A



34. TREATMENT CONTROL ROOMS

PTE to be installed in Treatment Control Rooms is shown in ***Table 1: Treatment Control Room Equipment***.
The area planned (4 m x 4 m (13' x 13')) is sufficient for the PTEV equipment.

The following is required:

1. An antistatic computer type raised floor is required in the TCR. Its free height will be about 30 cm (1'). It will be adjusted to the corridor level. A standard raised floor (computer floor type) will be sufficient.

2. The D/BT must determine and supply all customer equipment and furniture, such as built-in caseworks and countertops, tables, filing space and storage to support PTEV and customer requirements.
   There shall be 2 countertops: 1 on the right of the TCR, 1 on the left.
   There will be an access panel below the countertops and several holes with grommets in each countertop for computer cabling electrical conduits access.
   Elevation of the countertops of the TCR is roughly 80 cm (2'-7½").
   Depth of this countertop is at least 80 cm (2'-7½").
   The clearance between this countertop and the wall-mounted cabinet or shelving above must be at least 50 cm (1'-8"). The D/BT shall provide a continuous wall shelf 50 cm (1'-8") above the countertop for PTEV computer screens and monitors.

3. For the screens and the computers, D/BT shall allow 25 cm (10") clear space behind countertops for cable access. Behind and below these countertops the D/BT shall provide a minimum 25 cm (10") cable chase. These cable chases shall be covered by a removable panel built-into and by the D/BT casework sub-contractor.

4. For Printers, D/BT shall allow 25 cm (10") clear space behind and front of countertops, for power and cable access (min. 15 cm (6")).

5. The computer hard drives are stackable and/or could be placed under screens. Possibly a computer hard drive unit would be installed under the countertop in a "tower" case.
   .
6. D/BT shall provide additional space on west wall for at least: 2 telephones, intercom, notebook, records, 2 Close Circuit TV (CCTV) monitors, 2 CCTV pan, tilt and zoom controls, and Oncology Information System interface.

7. There will be a suspended ceiling (approx. 250 cm (8'-2½") height) with indirect lighting with dimmer control above the wall shelving to eliminate glare on the monitor screens.

8. The cables will be installed and the installation will be verified to comply with the requirements of the IEC 60204 standard.

9. The screens supplied by PTEV in a standard TCR will be as follow:

   For the treatment, the D/BT shall equip the room to allow the installation of:

   - 1 workstation OIS + 1 monitor
   - 1 workstation TCRW + 1 monitor
   - 1 workstation PCVUE + 1 monitor
   - 1 X-Terminal + 1 monitor

   With that, the D/BT shall equip the room to allow the installation of 1 X-Terminal
   For the alignment, the D/BT shall equip the room to allow the installation of:

   - 1 workstation PPVW + 1 monitor
   - 1 workstation Respiratory Gating + 1 monitor
   - 1 workstation I/R tracking + 1 monitor

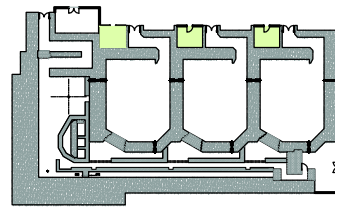
   This list can be modified to fit with the specific options of the contract.

10. A floor drain shall be provided under the raised floor.
    Each TCR shall be connected to its TR by cables cat6 provided and installed by the D/BT. The cables will allow the KVM's connection. One conduit will be reserved for dosimetry signals.

Table 1: Treatment Control Room Equipment

Equipment	Quantity	Weight (kg / lbs)	Height (cm / in.)	Width (cm / in.)	Depth (cm / in.)
VDUs	TBD	Standard 21" or 23"			
Computers	3	12/27	8 / 3.1	41.5 / 16.4	41 / 16.1
Keyboard	3	Standard	Standard	Standard	Standard
Printer	1	27 / 60	40.5 / 16	51 / 20	51 / 20
Mouse Area	1	- / -	- / -	25.5 / 10	30.5 / 12
Emergency Stop Panel etc	1	TBD	TBD	TBD	TBD

The picture of the TCR on this figure is an artist view for information ONLY



S.A. ION BEAM APPLICATIONS

REV:	DATE:	MODIFICATION:	DRAFTMAN:	CHECKED BY:	VALIDATED BY:
A	30/04/15	Original issue	LCHEN	QBA	PV

MATERIAL: –
SCALE: (A3)
DIMENSIONS: mm
TOLERANCES: –

PROJECT: PROTON THERAPY
S/PROJECT: TATA HBTF MUMBAI

II.
ROOMS

Other rooms

TITLE:
Treatment Control Room

07.42.33.

34.01 A